January, 1953

SCIENCE AND INDUSTRY

THE JOURNAL OF GLASS MANUFACTURING

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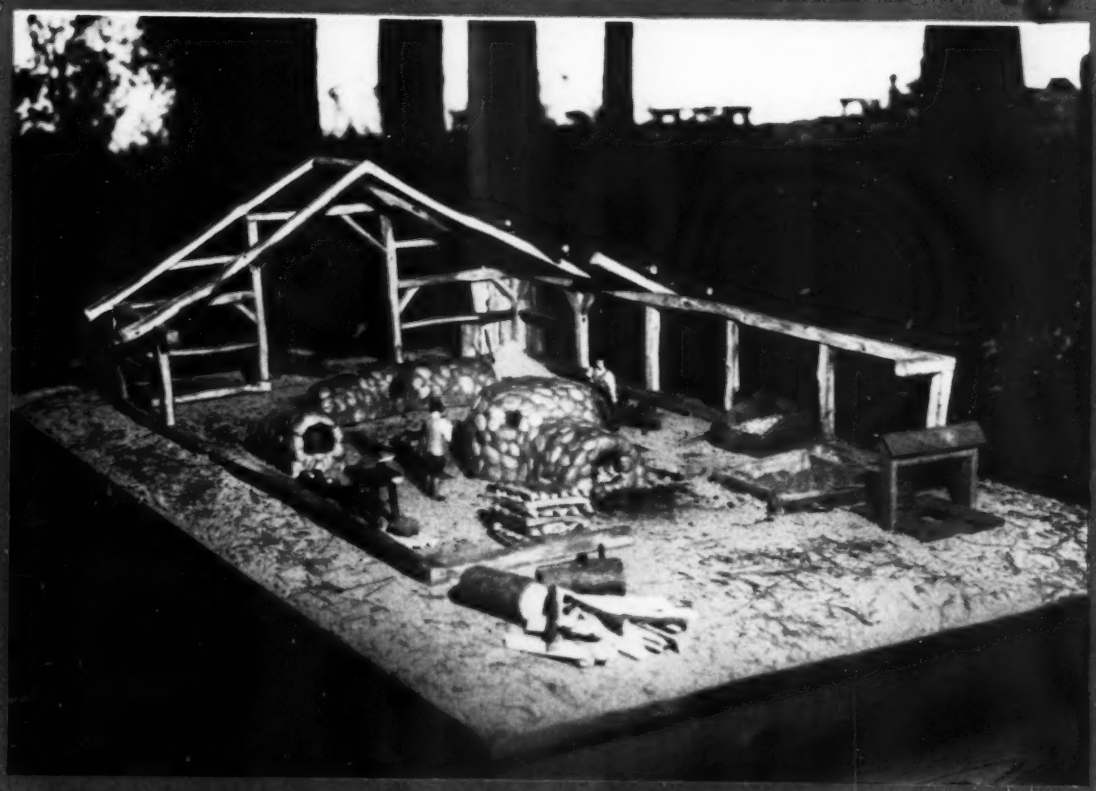

● ● Scale model of America's first glass factory in Jamestown, Va. *See Page 19.*

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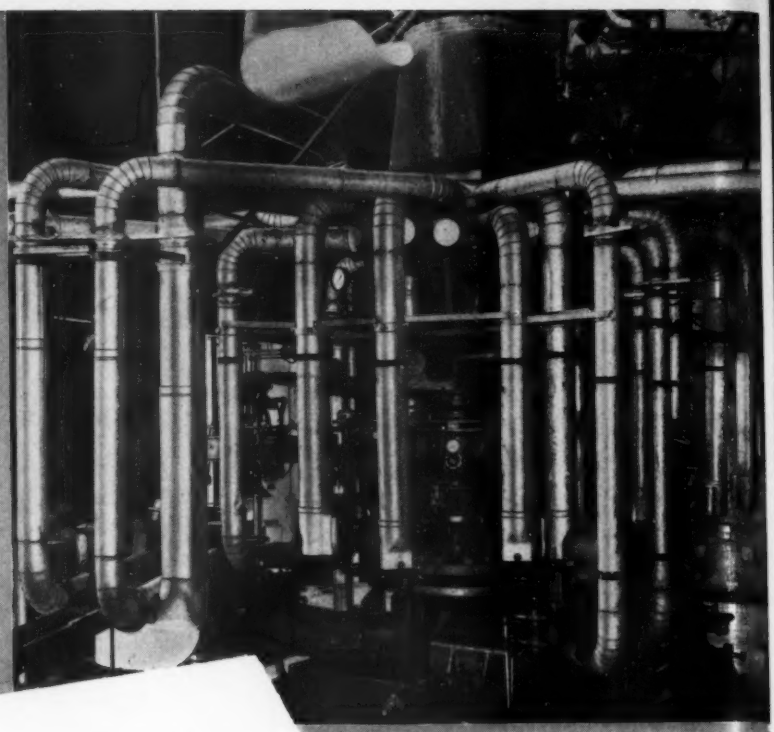

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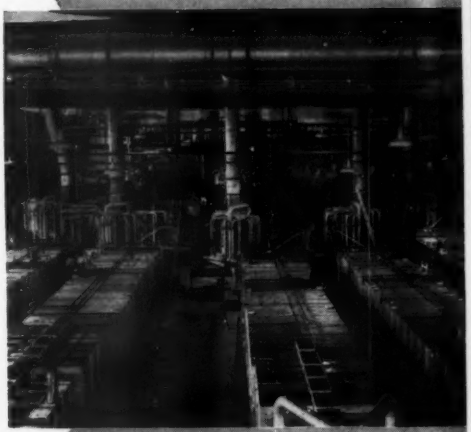

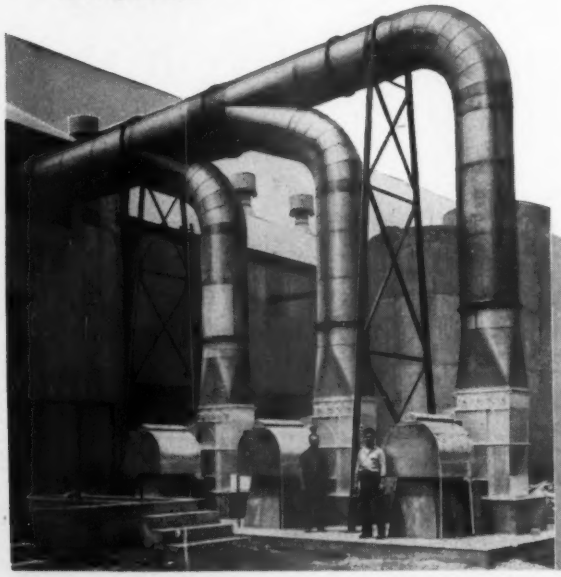

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CONTENTS FOR JANUARY : 1953

The Conference on Glass Problems in Columbus ... 17
A review of the papers delivered at the Thirteenth Conference on Glass Problems.

America's Oldest Industry—Glassmaking ... 19
Glassmaking is designated the first industry to be established in America at three-day meeting in Jamestown, Va.

American Window Glass Company Opens New Research Center ... 20
Provision for physical testing and analysis and versatility of equipment prime objectives in planning of this new laboratory.

Humidity Conditioning Essential to Safety Glass Manufacture ... 22
The importance of proper atmospheric conditions in the processing of laminated glass is outlined in this article. By G. A. Kelley.

Recent Translations of Russian Papers of Interest to the Glass Industry ... 27
Abstracts of eight papers translated from the Russian journal of the glass and ceramic industries.

Inventions and Inventors ... 29
A summary of recently issued patents of interest to the glass industry.

Research Digest ... 34
Practical interpretations of glass technology.

Current Statistical Position of Glass ... 35
Production, shipments, and employment in the glass industry for the months of October and November 1952.

New Equipment and Supplies ... 39

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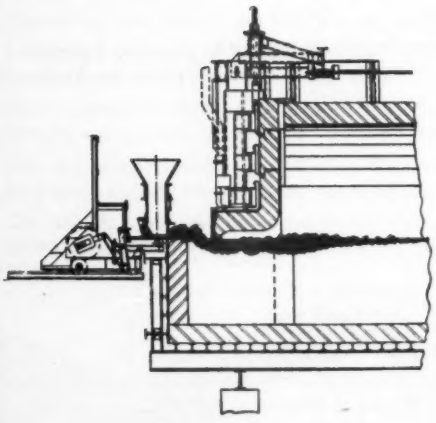

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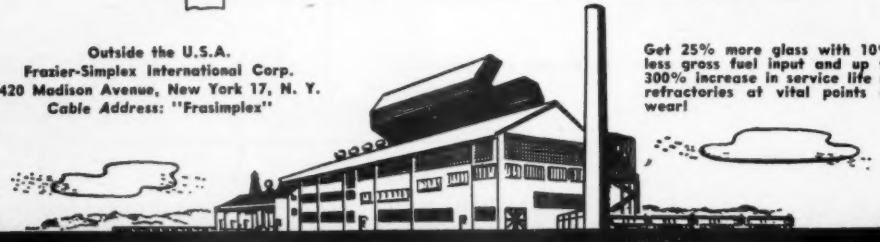

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THE GLASS INDUSTRY

VOLUME 34, NUMBER 1, JANUARY, 1953

THE CONFERENCE ON GLASS PROBLEMS IN COLUMBUS

The 13th annual Conference on Glass Problems was held at the Ohio State University, December 4 and 5, under the direction of Dr. H. H. Blau, Professor of Glass Technology of the Department of Ceramic Engineering and Vice President of Production and Development of Federal Glass Company. The excellent program, which dealt with problems on (1) raw materials, (2) furnace design and construction, (3) melting, fining, and homogenizing, and (4) plant and equipment design, was undoubtedly responsible for the record attendance at this meeting.

With Hugh L. Kline of the Cohart Refractories Company presiding, the opening session got under way with the welcoming address by F. W. Heimberger, Vice President of the Ohio State University, who pointed out the various facilities which are available to industry at the University.

John T. Ogden, publisher of THE GLASS INDUSTRY and THE GLASS PACKER, stated in his paper, "Providing Information for the Glass Industry," that information is the "life blood" of modern industry and technology. There are many difficulties in providing information which fulfills the needs of so varied an industry as the glass industry and its diversified interests. The needs of the various segments of the glass manufacturing industry were ably and thoroughly discussed with emphasis on the steps taken and the methods used for providing knowledge and keeping pace with the evolutionary changes and rapid strides taken by the American glass industry in the past decades. The ways in which the men in the plants, in the research laboratories, and in executive capacities contribute and can contribute to meeting these ever-changing needs were sketched.

In the paper "The Design, Construction, and Operation of Oil Burners for Glass Melting," the development of highly satisfactory oil burning equipment for use with Bunker C and lighter grades of oil was discussed in great detail by Thomas Coyle of the Maryland Glass Corporation. The author confined his discussion to his own direct experience in the plant, and kept generalized approaches to a minimum. It is well recognized that this plant has been a leader in the industry in meeting the problems of applying oil to combustion for the melting of container glass. They have operated with clean, uniform fires and have overcome the damages and deterioration of ports, furnace crowns, and regenerators by patiently and skillfully evolving equipment and methods of handling oil from the time it is received to its complete combustion in the furnace. This included centrifugal methods for eliminating sludge and deposition of solids in the oil before delivery to the burners. Details were presented on the evolution of a simple, easily maintained burner system for application above and at the rear of side ports without impingement difficulties or the burning out of furnace crowns and port arches. Particular emphasis was placed on the atomization of the oil, with well controlled oil temperatures and pre-heated air for atomization. The advantages of using a "dutch oven" arrangement for introducing the oil and getting preliminary combustion and atomization were clearly illustrated and demonstrated.

"End Port Tank Design and Operation" was the topic of the final paper of the morning session. Fred Motsch of the Foster-Forbes Glass Company illustrated the revolutionary changes which have been made in rear port tank design, construction, and operations. These were so amazing that some of his audience referred to "the iconoclasm" of these developments and his presentation. Mr. Motsch modestly states that most of the ideas had been suggested to him by others in the industry, but these ideas had been carried out with outstanding courage and thoroughness to render them sound and practical. The well-recognized difficulties of loss of draft in furnaces resulting from restrictions in tunnels, flues, and valves were recognized and overcome by placing a well-designed valve on the top of the regenerators themselves, thus eliminating the commonest causes for loss of draft. These had been used both with ejectors and stacks for removing the products of combustion. Rider arches were also eliminated by using basket-weave checkers. Costly furnace buildings were eliminated by construction of the melting part of the furnace on structures without sides and with only good roofs for protection with resulting economy and ease of access to the furnace parts. The melting end was completely isolated from the nose or

refiner with the elimination of bridge and shadow wall difficulties and carry-over in the refining or nose end of the tanks. By having the melter and refiner as complete independent chambers, better control was made possible, together with better accessibility for cooling and bridgewall and throat repairs. Conventional ideas of the need for large refining chambers had been exploded by progressively reducing their dimensions in new tanks to the point that the nose had become a very small conditioning chamber to provide a structure to which forehearths could be attached. These radical steps in design and construction have apparently resulted in outstanding advances in fuel economy, glass quality, and furnace life, with accompanying advantages in building costs, maintenance, and investment.

The second session of the Conference, which was presided over by Marshall Gleason of the Rodefer Glass Company, dealt mainly with the production and control of color in glass.

Opening the afternoon's activities was a paper delivered by R. R. Shively, B. F. Drakenfeld & Co., Inc., entitled "The Use and Conservation of Selenium in Glass Manufacture." The use of selenium as a decolorizer has been sharply curtailed due to its high demand in defense uses, such as the manufacture of electrical rectifiers and alloy steel. Since the glass industry is getting at least 25% less selenium than in previous years, glass manufacturers are having to revise their batch compositions and furnace procedures in order to compensate for this reduction and still maintain acceptable quality. The outlook for the future for the glass industry is for even less selenium than that previously mentioned. Dr. Shively stated that in order to prevent the volatilization of selenium, (1) arsenic and sulfates should be kept at a minimum, (2) furnaces should be operated at a constant temperature (the larger the volume of products of combustion, the less selenium is retained), (3) 4-5 lbs of niter/1000 lbs sand is beneficial. To reduce the amount of selenium required (a) low iron content sand and other materials should be used, (b) chromic oxide in the batch should be kept at a minimum, (c) cullet should be extremely clean (foreign cullet is one of the worst offenders for the introduction of undesirable color in glass).

The British manufacturers have found that ½ lb. of arsenic and 0.5 oz. selenium per ton of glass is sufficient for decolorization. In the discussion which followed, it was stated that some manufacturers in this country are producing colorless glass with only 0.2 oz. selenium/ton of glass and no arsenic.

Axel Ottoson of the Imperial Glass Company, in the paper "Some Aspects of Controlling the Color of Glasses," discussed the aspects of controlling the color of glass with particular emphasis on the hand industry, including pot furnaces and day tanks. Cleanliness is of prime importance in any consideration of the variation of color in glass. The mixer, raw materials, and cullet must be free from contamination. Accuracy in weighing of the batch, particularly of the small weight coloring constituents, is entirely dependent upon the scale operator.

Mr. Ottoson stated that amber and pastel glasses exhibit the most marked variations in color and are also the most difficult to control, especially the color complementary to iron. It is extremely difficult to mix a small amount of colorant into a large batch uniformly. This has been overcome largely by the introduction of the colorant into a cullet, which can then be mixed with some inert material before being added to the final batch. By this means the coloring agent can be weighed out in larger amounts, thereby reducing the errors in the final weighing. If any variation of color is required, this should be accomplished by changing the concentration of the cullet before it is added to the final batch.

Completing the Conference's first day's program, R. W. Hopkins of The Calumite Company discussed the control of color in amber glass in the paper, "Factors Influencing the Control of Color in Amber Glasses." In surveying amber glasses, a large spread in color is observed. It has been estimated that only 50% of the amber glass produced in continuous furnaces would meet rigid specifications. One method of evaluating the color produced in amber glass by sulfur is the Yellowing Factor, which is defined as,

$$\frac{\%\text{ transmission at wavelength 650 mu} - \%\text{ transmission at wavelength 450 mu}}{\%\text{ transmission at wavelength 550 mu}}$$

There are two theories as to the mechanism of the color in amber glass, one being the Cole theory, which postulates a long sulfur chain in conjunction with the Si-O structure, and the other of Nuemann and Dietzel, which is based on the reaction, $2FeS + Na_2S_2 \rightleftarrows 2NaFeS_2$. Oxidizing and reducing conditions during the melting process are of prime importance in the production of amber glass of constant color. Reducing conditions account for the retention of sulfur, while oxidizing conditions result in its evolution. With this in mind, a complete review, together with the equations for the reactions, was given for the various components in a glass batch which can produce either oxidizing or reducing conditions. The colors produced by sulfur can range from blue through yellow to brown, as the % of sulfur retained increases from 2.4% to 11.5%. As the % sulfur retained increases, the % transmission of light of constant wavelength (approximately 5,000Å) decreases.

The first paper to be presented on the second day of the Conference was "Methods of Approach to Stone Identification Problems in Glass Manufacturing" by Howard W. Swift of the Libby-Owens-Ford Glass Company. Mr. Swift pointed out the difficulties encountered in attempting to identify stones in the finished glass product. In this respect the petrographer and the furnace operator should work together in order to achieve this goal. In submitting a specimen, the furnace operator should include all pertinent data concerning the stone and/or stones. If the history of the specimen is known, thin section microscopy will generally suffice; if the stone history is unkown, powder method microscopy must be used. Included in this presentation was a general outline for the preparation of thin sections. In order to properly evaluate all stones submitted to him, the petrographer should be thoroughly acquainted with all types of refractories used by his company. His final report should include, in addition to the factual observations, a section on conclusions and/or predictions.

The recent developments in stereo cameras have brought about an entirely new method of photography which can have important applications in the field of furnace photography. This topic was discussed in the

(*Continued on page* 44)

AMERICA'S OLDEST INDUSTRY—GLASSMAKING

The first official designation of glassmaking as America's oldest industry climaxed a 3-day meeting at Williamsburg and Jamestown, Virginia, of Glass Crafts of America, trade group of leading handmade glass producers, and officials of the National Park Service of the U. S. Department of the Interior.

The birthplace of American industry has now for the first time been authoritatively established, as a result of 3 years of intensive archaeological and historical research on two Continents, said Conrad L. Wirth, Director of the National Park Service, speaking at a banquet which brought the conference to a close.

Plans were set for the restoration and preservation of the remains of America's first glasshouse, and to develop the site as a center of industrial and cultural interest. Carl W. Gustkey, Chairman of a 3-man committee which has handled the project for Glass Crafts of America, announced that his group has committed $35,000 as a start toward the development and will invest more funds as the project develops. W. F. Dalzell, President of Glass Crafts of America, said that the re-creation of the glass factory, the development of museum exhibits, and other related projects at the Jamestown site will react profitably for retailers throughout the country by sharply stimulating public interest in glass. "For the first time, the industry will be able to tell the full, dramatic story of the significant role which glassmaking has played in this country's history for over 3 centuries, and its contribution to the high standards of living which have made our country the greatest in the world," said Mr. Dalzell.

Announcements made at this meeting climax an unprecedented cooperation between industry and government to uncover the facts which were obscured by a national mystery of nearly 350 years' duration.

In 1608 a handful of settlers built a glass factory, equipped it with crude furnaces of boulders and clay, and fashioned objects of glass. For many generations the legend existed that this factory had been located on the jutting mainland shore (called Glass House Point) just across from Jamestown Island. After the factory had been abandoned and furnaces crumbled, centuries of rain and wind deposited a foot of protecting soil over the ruins, and the lost site was all but forgotten.

Three years ago J. C. Harrington, National Park Service archaeologist, and his staff excavated from the site the first fragmentary proofs that the glasshouse had actually existed there, in the form of fine threads of drippings of glass and boulders and masonry ruins of a glass furnace. This discovery prompted broader exploration and documentation of subsequent findings, until the original foundations of the furnaces themselves were unearthed.

Prior to this announcement by the National Park Service, there had existed no concrete proof of the origin of American industry. The prodigious task of excavating the site, re-creating the glass plant, establishing its method of operation, and painstakingly documenting each move with historical records on both sides of the Atlantic are now climaxed by the official announcement by Mr. Wirth that America's first industry was the making of glass at Glass House Point near Jamestown Island in 1608.

Mr. Wirth said that the Colonial Parkway will be extended to Jamestown from Williamsburg, Virginia, so that the spot can be developed as a landmark which will assume a prominent place among national centers of historic and cultural interest. As such, it is expected to attract visitors, sightseers, researchers, and students from all over the world.

The restoration will include putting on display, as they now exist, the ruins of the first glass furnaces after they are treated in such a way as to preserve them. A shelter similar to the one which existed in 1608 will be built over the site and displays set up to show how the glass factory appeared and operated. Nearby, a duplicate of the old furnaces and workshop will be re-created and put in actual operation by skilled craftsmen who will use it to make glass just as it was made there nearly 350 years ago.

The Park Service will install a drive into the area from the extended Colonial Parkway and build a parking area. A museum display will further round out the exhibition.

Initial step in the restoration is a scale model of the original glass factory and the site, just completed by NPS artists and craftsmen under Mr. Harrington's supervision, to be used as a guide when actual development work gets under way.

Principal remains uncovered during the archaeological excavating are reproduced realistically in the model. These include the main working furnace in which the glass was melted; kiln for firing new pots and for preheating pots before they were placed in the working furnace; furnace or oven used for "fritting" or preliminary fusion of glass ingredients; and an annealing furnace. Nearby are a well, a clay pit, and a cullet pile. Over-all dimensions of the factory building were about 37′ x 50′. The model shows the structure as a very primitive framework of timbers.

The restoration of the first American glasshouse, the development of the site as a center of interest, and the construction of a scenic highway leading to it (Glass House Point is otherwise inaccessible) will provide a landmark where all American industry will commemorate its origin, Mr. Wirth said. A foundation is being established to administer funds for the initial development.

The re-creation and construction program is expected to be completed by 1956. A special committee, authorized by the Virginia General Assembly, has been named to plan and direct the celebration, in 1956, of the 350th anniversary of the landing (May 13, 1606) at Jamestown. The celebration will also mark the 175th anniversary of the victory (October 19, 1781) at Yorktown.

Committee handling the Jamestown project for Glass Crafts of America since its inception consists of Carl W. Gustkey, Chairman, W. F. Dalzell, and T. Clarence Heisey.

Hosts at the banquet, which was held at Williamsburg Lodge, were the Glass Crafts of America group. Among those present were T. Clarence Heisey, A. H. Heisey & Company; Mr. and Mrs. Carl W. Gustkey and the Misses Lynne and Lois Gustkey, and Mr. and Mrs. Carl J. Uhrmann, Imperial Glass Corporation; Mr. and Mrs. W. F. Dalzell, and Mr. and Mrs. Robert F. Hannum, Fostoria

(*Continued on page* 46)

AMERICAN WINDOW GLASS COMPANY OPENS NEW RESEARCH CENTER

Research Centers may be built of steel and stone—and, of course, glass—but all of these are secondary to sound creative planning.

When the facilities of the American Window Glass Company became inadequate for its expanded research program, the American engineers and technicians tackled the problem by asking "What do we need in our new Research Center?" The answers were not as simple as the question, but finally objectives were set up.

Of primary importance was a good substantial building which was free from noise, dirt, and vibration. The most convenient location would be on a good secondary road, readily accessible to the home office and nearby factories. The location should also provide pleasant surroundings and room for expansion.

With these objectives in mind, a circle was drawn on a map and every possible location in the area was explored. The survey turned up two suitable building sites and one existing building which "had possibilities." This building was a concrete block and steel garage building in Monroeville, Pennsylvania. It was sturdy in construction but surrounded by old cars, mud, and refuse. Along with the building, however, were over seven acres of rolling hill country. Pictures were taken, layouts were drawn, discussed and redrawn, costs of remodeling were explored, and soon ideas began to crystallize. The sordid surroundings were imagined away and a Research Center was born.

Two thoughts were uppermost in our planning:

First, the main emphasis should be on physical testing and analysis with chemical methods available but secondary. Physical testing offers the quickest method of tailoring glasses to the specific needs of our various customers.

Second, versatility. In a laboratory each piece of equipment should be usable for many jobs and the laboratory space must accommodate many kinds of equipment.

With these requirements in mind, a modern versatile laboratory with all necessary services was fitted into the building.

Let us take a tour of the building. Stepping through the reception room one enters a long corridor which runs the length of the building and divides the office in the front from the laboratories just across the hall. Figure 1 shows this corridor with a corner of the library on the right and the business office just beyond. In addition to these, there are smaller offices for the technical personnel and a lunchroom for the convenience of the employees.

Across the hall one enters the first of the laboratories. On the left (Fig. 2) are the Preston densitometer and the Beckman Spectrophotometer. The latter is used both for routine control and development of new colors of glass or plastics. On the right (Fig. 3), a technician measures the solubility of glass in distilled water. The impedance bridge and oscilloscope he is using can also be used for tests of packing paper, dielectric constants, and

Fig. 1.

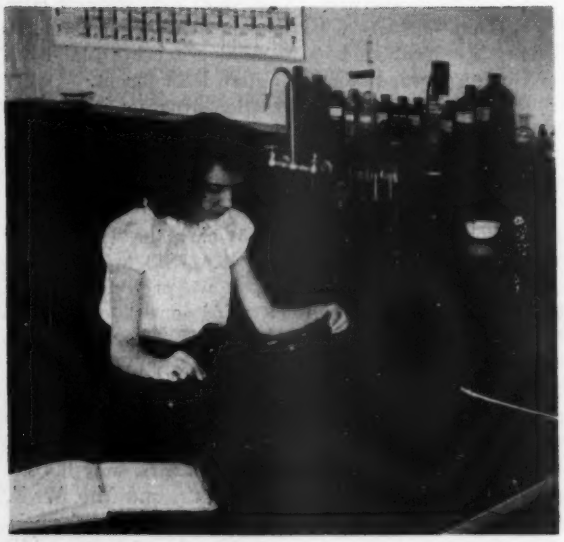


Fig. 2.

Fig. 3.

many other measurements. Ahead, in the other end of the laboratory (Fig. 4), a project engineer and a technician are about to make a casting of a sample of glass from a high temperature melting furnace. Here new compositions are developed, fining time tests are made, and refractory wear is studied. Other furnaces in view are used for determination of liquidus temperatures, thermal expansion, and for annealing studies.

Turning to the left, one enters the chemical laboratory where a research chemist is studying surface treatments (Fig. 5). Adjacent to the chemical laboratory is a room for dry chemical storage and a dust- and moisture-proof balance room where glass batches are compounded and analyses are completed.

Ahead is a general purpose laboratory. An engineer is studying a test specimen of plastic at —100°F. (Fig. 6). This versatile testing box can be set to hold any temperature from +260°F. to —140°F.

The ceramics laboratory, where all refractories are studied, is to the left. Here a ceramic engineer is working on a mold while a technician loads the automatic sieve shaker. (Figure 7.)

Going back to the hall, one again turns left into the photographic dark room and in the center of the building enters the dark laboratory. This room is 28′ long to accommodate certain tests of glass distortion. Figure 8 shows one side of this laboratory with a polarimeter, microscope, refractometer, and infrared filter photometer. All of the equipment in this laboratory requires darkness or semi-darkness for good operation.

This is the end of the conducted tour. The planning stage is over. The objectives have been met and the American Window Glass Company now has a well-equipped Research Center which is adequate for its program of continuing research so that it may better serve the needs of its customers.

Fig. 6.

Fig. 4.

Fig. 7.

Fig. 5.

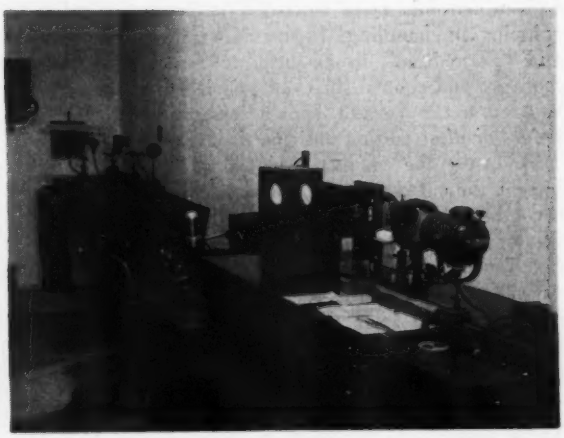


Fig. 8.

HUMIDITY CONDITIONING ESSENTIAL TO SAFETY GLASS MANUFACTURE

By G. A. KELLEY, Chief Engineer
Kathabar Division, Surface Combustion Corporation, Toledo, Ohio

A dry, cool atmosphere is necessary in the vinyl resin plastic processing and storage rooms in order to maintain this safety element of laminated glass in its optimum processing condition.

Safety glass has a romantic history, starting 'way back in the horse-and-buggy days with two accidents which came to the attention of a French chemist. One, his pretty niece was disfigured by flying glass when her carriage overturned; two, he dropped an old bottle in his laboratory and noted that the glass cracked, but that the flask remained intact. The dried solution had left a tough, pliable film inside the bottle.

Many of the primitive attempts to laminate two pieces of flat glass with an interlayer of some transparent bonding agent to achieve safety in automotive windshields are still remembered by many motorists. It has only been within the past 25 years that safety glass has been perfected.

What Is Laminated Safety Glass?

Laminated safety glass is a composite structure consisting of two or more panes of high-quality glass and interposed sheets of plastic. In general, its manufacture consists in assembling a sheet of pre-cut vinyl resin plastic between two panes of glass. The resulting glass plastic "sandwich" is then bonded into a single structure by application of heat and pressure.

Glass used in the manufacture of laminated safety glass has physical properties identical to those of conventional flat glass. Therefore, the safety features of laminated glass depend solely upon the plastic layer placed between and bonded to the two panes of glass, as shown in Fig. 1. The plastic and the bond to the glass are the safety elements.

Safety Glass Manufacture

The actual laminating process consists of passing sheets of the opaque vinyl resin plastic, received in large rolls, through a set of brushes to remove the excess soda with which this resin is coated to prevent sticking in shipping and handling. In succession, the plastic is dried and "normalized" in an oven to remove intercellular moisture and control shrinkage, cooled to room temperature, cut to the size and shape necessary, and stored either before or after cutting until needed. (See Figure 2.)

To insure the complete removal of the sodium bicarbonate, the cut sheets of vinyl plastic are passed through a continuous spray washer, using first warm, then chilled water, and finally through another dryer. After inspection for flaws under white light, the cut plastic is conveyed to the laminating room, where the glass panes are also introduced from the inspection station. The glass and plastic are cut automatically to identical patterns and sizes prior to assembly in the laminating room.

The glass panes, which have been similarly processed —cut, washed, dried, and inspected—are conveyed into the laminating room in identical pairs. Shown in Fig. 3 are operators assembling the two glass panes and the plastic sheet into the "sandwich" as the material moves along on a roller conveyor.

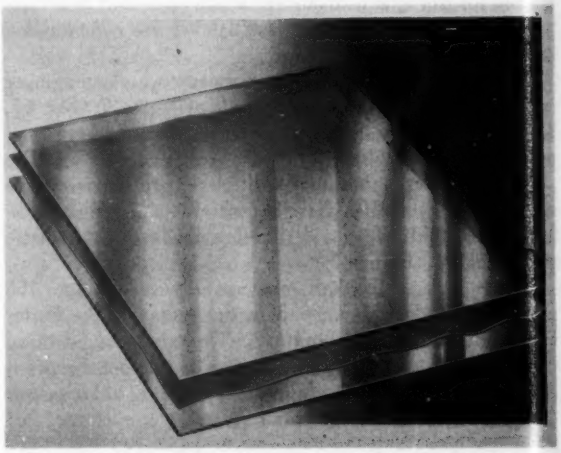


Fig. 1. Schematic view showing how a layer of vinyl resin plastic is placed between two panes of conventional flat glass to form a "sandwich" of laminated safety glass.

Figure 4 is a schematic work-flow diagram of the processing of the plastic and glass, from cleaning to the final bonding.

A nipping roll drives out all air from between the assembled glass and plastic "sandwich," which assembly is then conveyed into a lehr. A series of rubber-covered pressure rollers, plus the heat from the lehr, pre-press and seal the glass to the plastic to prevent oil penetration in the subsequent autoclave operation.

Final adhesion is obtained in the bond by subjecting the "sandwich" to heat and pressure in the autoclave. Here the assemblies, loaded in tubs, are maintained at predetermined oil temperatures and pressures. The plastic becomes transparent and thoroughly bonds itself to the glass. Final edge-grinding and polishing complete the processing.

Humidity Control Essential to Vinyl Resin Application

But what has air conditioning to do with the manufacture of laminated safety glass? Without such conditioning, this product could not have been developed to its present high stage of perfection and low cost of production.

Vinyl resin at ordinary room temperatures is limp and tacky, making it difficult to handle and to apply to glass. At temperatures below 65°F. it becomes fairly stiff, but loses its stickiness. The material is also hygroscopic and will pick up enough moisture under humid

conditions to reduce the transparency of the safety glass.

It is accordingly necessary for efficient operation to maintain a dry, cool atmosphere (approx. 68°F. and 20% relative humidity) in the vinyl resin processing and storage rooms.

Infiltrated Air Problem

Slot openings for continuous conveyor belts which carry the cut plastic and glass and assembled "sandwiches," entering and leaving these conditioned rooms, posed a difficult problem due to the large amount of air infiltration. "Pin-point" movement of humidity conditioned air at the slot openings proved to be the solution. This practice operates on the principle of maintaining a positive pressure of dehumidified air on the conditioned space side of the slot opening. The technique prevents atmospheric infiltration and solves a critical problem in plastic handling operations.

Various systems of air conditioning and dehumidifying have been used by laminated glass manufacturers to attempt to maintain the required conditions of humidity and temperature. Recognition of the importance of maintaining a consistent and exact set of specified air conditions in the manufacturing spaces led three of the largest producers of safety glass to install chemical-type dehumidifying systems in their plants. These, plus other laminating plants, now use the Kathabar system for humidity conditioning their plastic cutting, storage, and assembly rooms.

Chemical Absorbent Humidity Conditioning Operation

Air to be conditioned by standard Kathabar equipment is first drawn into an air washer, where it contacts a spray of the lithium chloride-base moisture absorbing solution. Within this same air washer chamber are cooling coils over which the air and the solution pass.

Fig. 2. Operators sort and inspect plastic sheets following automatic cutting operation on large vinylite roll. Humidity conditioning is essential in this plastic cutting room for ready handling of sheets and to maintain the plastic at desired low moisture content. Operators wear hairnets and gloves to reduce possibility of foreign particles contaminating the plastic. *(Photo courtesy Libbey-Owens-Ford Glass Co.)*

The cooling medium—cooling tower water, well water, or refrigeration—determines the temperature of the absorbing solution as the absorbent contacts the air. The cooler the absorbent, the more moisture it is capable of removing. Also, this cooling medium can effect a temperature reduction of the outgoing air. Therefore, both humidity and temperature conditioning are attained in a single pass.

Following this air contact, the moisture-laden liquid absorbent flows into a standard regenerator to pass over low pressure steam pipes. The excess moisture is driven-off and the absorbing solution returned to the air washer at full strength for subsequent air conditioning.

Fig. 3. In the assembly room, the operators place a plastic sheet on one pane of glass and the second pane on top of the plastic. Glass and plastic enter and "sandwiches" leave the room on conveyors through slot openings, creating a room conditioning problem overcome by "pin-point" movement of air. *(Photo courtesy Libbey-Owens-Ford Glass Co.)*

Non-Contaminated Air Requirements

Air circulated in the plastic cutting room and particularly in the "sandwich" assembly room must be free from contamination. This includes both dirt and dust particles and damaging chemical air suspensions and fumes. If present in the conditioned air, these contaminations would be "sandwiched" into the completed product, and subsequent imperfect laminations would result.

An air washing type operation, in combination with adequate mechanical or electric filters, on air to be circulated is sufficient to remove dust and dirt particles. Liquid, and particularly chemical, air washing removes the possibility of a solid desiccant crumbling action, which perhaps would permit desiccant powder "carry-over" with the air stream into the conditioned room.

A chemical liquid air wash, such as obtained with the lithium chloride-base solution, also prevents chemical contamination of the plastic and glass. In this manner, a vital requirement in glass laminating plant operations —delivery of extremely pure air to the working spaces— is attained.

Varied Equipment Combinations Utilized

Several combinations of standardized components of

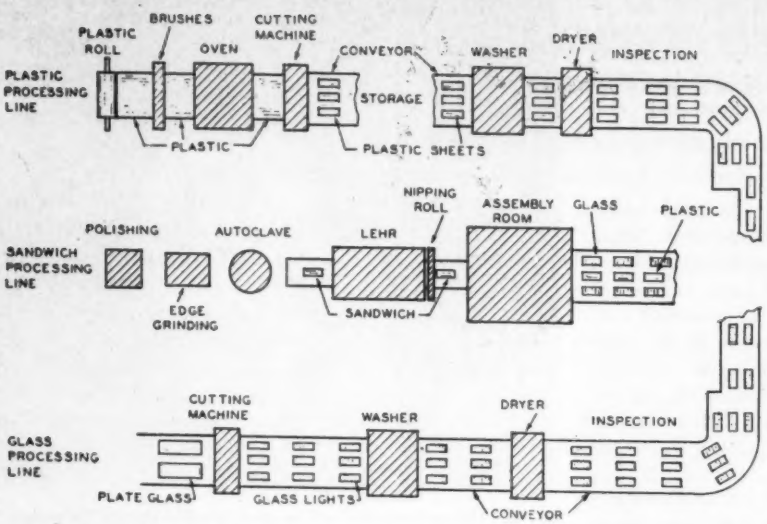


Fig. 4. Plastic sheets and glass panes flow in a parallel manner until their assembly in the completed "sandwich." Humidity conditioning is necessary in the plastic cutting room, plastic storage room, and the assembly room.

chemical absorbent type humidity conditioning equipment are utilized by the glass laminating industry to obtain the most economical arrangements to meet their humidity conditioning requirements. The selection of equipment is determined by which of the following sets of conditions are characteristic of the particular operation.

Each operation will require low humidity (low dewpoint) air under one of the following categories: (1) small volume of air, using both fresh and recirculated air; (2) large volume of air, using principally recirculated air; (3) large volume of air, using a high percentage of fresh air.

Small Volume Conditioning

One moderately-sized laminated glass manufacturer requires 2500 cfm of conditioned air delivered to his plastic drying, cutting, and assembly room. This space must be maintained continuously at conditions of 68°F. dry bulb and 20 grains of moisture per pound of dry air.

These optimum temperature and humidity levels for maintaining the plastic in its most usable condition are attained through delivery of 52°F. dry bulb and 15 gr./lb. air from a 2,500 cfm capacity Kathabar package unit. This type package equipment combines the air washer and regenerator sections into one compact unit.

A total of 1,700 cfm of recirculated air from the conditioned room is mixed with 800 cfm of fresh air prior to treatment by the dehumidifying equipment. This fresh air is at maximum design conditions of 95°F. and 120 gr./lb. The absolute humidity of the fresh-recirculated air mixture becomes 52 gr./lb. A total of 13.7 tons of refrigeration is required for the washer section cooling coils. This refrigeration tonnage handles the heat load of both the high temperature air and the hot, regenerated absorbing solution.

Moisture removed from the air is approximately 172 gallons per day. An afterheating coil, using 5 psig steam, is utilized to heat the dehumidified air a few degrees in order to maintain the required room temperature.

Lowered Operating Costs with Chemical Dehumidification

To reduce the absolute humidity of 2,500 cfm of air from 52 gr./lb. to 15 gr./lb. (20°F. dewpoint) through use of refrigeration cooling alone would entail operation of the entire system at sub-freezing temperature. It would be necessary to cool the air to 20°F. dry bulb and then to reheat this same air to the required 52°F. dry bulb delivery temperature. A significant operational savings is obtained through combination of refrigeration cooling with chemical dehumidification of air.

Operation at sub-freezing temperatures by refrigeration equipment alone would also necessitate double-coil capacity to effect continuous operation. One coil would defrost to eliminate its ice coating caused by condensed moisture, while the second coil performed its primary function. Otherwise, without double-coil capacity, costly equipment shutdowns for defrosting result, prohibitive in continuous operation as at glass laminating plants.

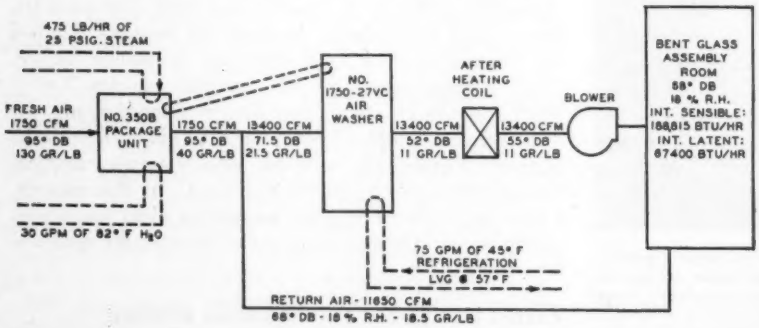

475 LB/HR OF 25 PSIG. STEAM
FRESH AIR 1750 CFM 95° DB 130 GR/LB
NO. 350B PACKAGE UNIT
1750 CFM 95° DB 40 GR/LB
13400 CFM 71.5 DB 21.5 GR/LB
NO. 1750-27VC AIR WASHER
AFTER HEATING COIL
13400 CFM 52° DB 11 GR/LB
13400 CFM 55° DB 11 GR/LB
BLOWER
BENT GLASS ASSEMBLY ROOM 68° DB 18 % R.H. INT. SENSIBLE: 186815 BTU/HR INT. LATENT: 67400 BTU/HR
30 GPM OF 82° F H_2O
75 GPM OF 45° F REFRIGERATION LVG @ 57° F
RETURN AIR - 11650 CFM 68° DB - 18 % R.H. - 18.5 GR/LB
TOTAL REFRIGERATION: 37T

Fig. 5. Flow diagram of the humidity conditioning system in a large laminated glass plant where recirculated air is principally utilized. Here one unit dehumidifies fresh air and regenerates the absorbent solution for the entire system, thereby obtaining maximum efficiency from the 37 tons of refrigeration.

Large Volume Conditioning Using Recirculated Air

Return air from the conditioned room during summer operation contains less moisture than fresh air, thereby lessening moisture removal requirements for dehumidifying equipment in an air conditioning system. Using a high percentage of recirculated air in the system effects a savings in both initial equipment costs and operating costs.

A large producer of bullet-proof safety glass for aircraft has an installation in operation based on this economic principle, diagrammatically sketched in Fig. 5. Here the problem was to maintain the bent glass assembly room at conditions of 68°F. and 18.5 gr./lb.

The conveyor belt slot openings amount to only 1.2 square feet, so that a relatively small volume of conditioned air was required for this purpose. Rate of flow of plastic through the room is 602 lbs./hr., cooled in this space from the dryer temperature of 100°F. to the assembly temperature of 68°F. Heat treated bent glass, 1,020 lbs./hr., is cooled through an identical temperature range. These products create a sensible heat load of 21,300 Btu/hr.

To solve these attendant problems, this manufacturer has installed a 3,500 cfm capacity Kathabar package unit to reduce substantially the absolute humidity of the small amount of fresh air required (see Fig. 5). Inexpensive city water is used in the cooling coils.

This dehumidified fresh air then mixes with the large volume return air for subsequent conditioning in the large capacity air washer. Purpose of dehumidifying the fresh air alone is to reduce economically some of the air washer load. Total moisture removal in the entire system is approximately 550 gal./day.

Thirty-seven tons of refrigeration are needed for the air washer cooling coils. Considerably more of this expensive cooling would be necessary but for the high percentage (87%) of recirculated air. Again, for refrigeration cooling alone to dehumidify the air to the very low delivered condition of 11 gr./lb. would entail operation at sub-freezing temperatures.

Another economical feature of this arrangement is that the package unit also serves to regenerate the absorbing solution both for its own requirements and for the air washer. In this instance, the package unit is of sufficient size to handle the entire regenerating load. By serving in this dual capacity, the package unit eliminates the need for a regenerator for the air washer.

Largest Laminated Glass Plant Air Conditioning System

A separate plant of this same company as cited above employs a different equipment arrangement for air conditioning their plastic cutting and assembly rooms. Requirements call for a total of 39,500 cfm of air delivered to these spaces to maintain conditions of 68°F. and 20 gr./lb. This installation, erected in 1945, represents the largest air conditioning system for laminated glass manufacture.

Very heavy sensible heat loads occur in these two rooms. In order to insure that a sufficient volume of conditioned air would be delivered to the spaces, it was necessary to engineer for theoretical cooling a total of 77°F. of 700 lbs./hr. of vinylite plastic in the cutting

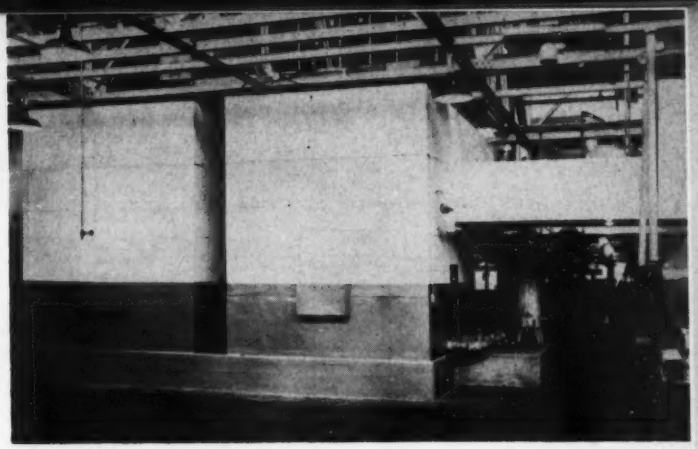


Fig. 6. Two of four air washer units in world's largest safety glass plant air conditioning system. A total of 39,500 cfm of air is delivered to the plastic cutting and assembly rooms to maintain 68° F. DB and 20% R.H.

room. By the same token, in the assembly room, 32,000 lbs./hr. of flat glass and 19,400 lbs./hr. of bent glass cooled through 17° F. had to be considered. This system employs four Kathabar air washers in a parallel arrangement. Two of these units are illustrated in Fig. 6.

In this instance, also, the per cent recirculated air is high. A volume of 31,000 cfm return air from the two rooms mixes with 8,500 cfm fresh air for passage through the air washers, each handling 9,875 cfm and using refrigeration as the coolant. The fresh air, prior to mixing, is markedly cooled and dehumidified in a precooling coil utilizing both available 55°F. well water and refrigeration. The availability of well water in this instance removed the necessity for an additional air washer to handle fresh air alone.

Air leaves the air washers at conditions of 66°F. and 14 gr./lb. Additional refrigeration is utilized to cool further, but not dehumidify, the air to approximately 53°F. for delivery to the two rooms. For the entire system, 125 tons of refrigeration are used.

The washers remove a total of 1,240 gallons of water per day. However, in consideration of the large total volume of air handled, the amount of moisture removed is comparatively small. The precooling action on the fresh air also plays a part in maintaining this low figure, as approximately 790 gal./day of water is removed prior to the air washer treatment.

One regenerator handles all four washers for reconditioning the absorbing solution. This is possible due to the low total moisture figure. However, a unit, termed an economizer, through which the available 55°F. well water circulates, cools the hot absorbent as received from the regenerator in order to take some of the cooling load from the subsequent absorbent washer action. This process cuts down considerably on the amount of refrigeration needed in the air washers.

To supply air for "pin-point" conditioning the 20 square feet of conveyor belt slot openings in the spaces, a separate package unit is installed to handle an additional 4,000 cfm, all fresh air. This air is continuously distributed to the room interior, at the slots, preventing atmospheric air from infiltrating.

Large Volume, High Percentage Fresh Air Conditioning

This same laminated glass manufacturer utilizes a third

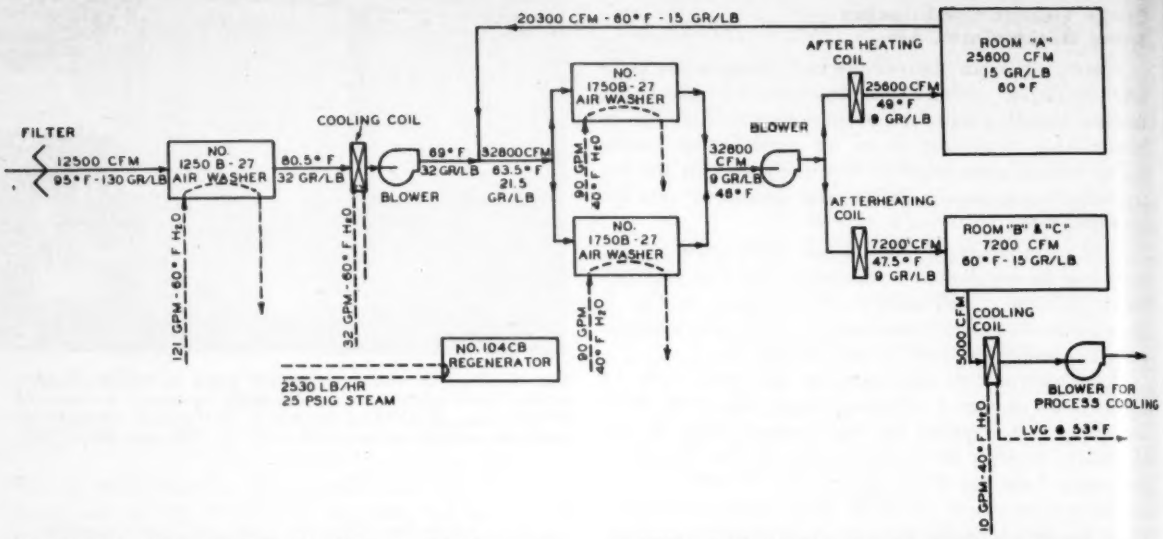


Fig. 7. Flow diagram of the humidity conditioning system in another large laminated glass plant where a high percentage of fresh air is used. The single air washer dehumidifies fresh air by using inexpensive well water; the parallel units complete the treatment of the total air with refrigeration. One regenerator handles all three air washers.

air conditioning system for his specialty glass room, where conditions to be maintained are again 68°F. and 18% R.H. This room, used for production of laminated glass in forms other than the conventional flat panes, has a design load of 19,400 pounds of glass and conveyor belt slot openings of 12.7 sq. ft.

A total of 10,000 cfm of conditioned air is delivered from an air washer to the room, of which only 50% is recirculated. Total moisture removed by the chemical dehumidifier is approximately 480 gal./day. Here it is economical to utilize existing refrigeration cooling to reduce the temperature and humidity levels of the fresh air prior to mixing with the return air.

The use of a high percentage of fresh air demands an increase in moisture removal capacity of the air conditioning system for the total volume of air handled as compared to those examples already cited. Therefore, again economics dictated an arrangement of equipment to function in a different type system.

Receiving the mixture of fresh and recirculated air, the single air washer discharges air directly into the room at conditions of 51°F. and 12 gr./lb. The absorbent is reconditioned in a unit called a regenerator-economizer. Actually, it is nothing more than a standard package unit in which the solution is first regenerated in the regenerator section and then cooled in the washer section, prior to the absorbent return to the dehumidifying cycle. Low pressure steam, 25 psig, is used in the regenerator coils, and 75°F. city water in the package unit washer coils.

This inexpensive supply of city water to cool the hot absorbent reduces the refrigeration load in this system to 70.5 tons, requiring a 75 HP compressor. An additional 5.6 tons of refrigeration cooling would be necessary if it were not for the regenerator-economizer. Although difficult to accomplish this same air conditioning through refrigeration cooling alone, 97 tons of refrigeration would be required.

The difference between 70.5 and 97 tons of refrigeration cooling represents only part of the cost savings here, however. The 97 tons of refrigeration would normally require a 200 HP compressor for this application, as the air would need be cooled to 16°F. dry bulb in order to obtain an absolute humidity of 12 gr./lb. The existing equipment represents a significant initial and maintenance cost savings compared to other possibilities for accomplishing the same results.

Series-Parallel Equipment Arrangement

Figure 7 illustrates schematically a still different equipment arrangement for economically handling even larger volumes of air, of which a high percentage is fresh. This installation in the plant of another very large producer of laminated glass delivers 32,800 cfm of air to the laminating rooms. Of this volume, 12,500 cfm is high humidity fresh air.

The total sensible (388,780 Btu/hr.) and latent (134,600 Btu/hr.) heat loads in these spaces is exceedingly high. Glass production was based on 31,500 pounds, and plastic production on 10,000 pounds per hour.

Here two air washers in parallel receive a mixture of partially conditioned fresh air and recirculated air. The single air washer, in series with the other two, substantially reduces the moisture content of the fresh air prior to mixing it with that which is recirculated, thus attaining maximum efficiency from a minimum of refrigeration.

Readily available and inexpensive well water is used to cool the absorbent in the fresh-air washer. This same well water further cools the fresh air before the mixing operation occurs. Total moisture removal by all three washers amounts to the very large quantity of 3,000 gal./day under maximum conditions.

Regeneration of the absorbing solution is handled in a very economical manner. A single regenerator is capable of reconditioning the absorbent for all three air washers, even though the moisture removal load is quite high.

Moisture-laden solution from the parallel air washers is pumped to the single washer, and in turn to the regenerator. The dehumidifying performance of the system

(*Continued on page* 42)

RECENT TRANSLATIONS OF RUSSIAN PAPERS OF INTEREST TO THE GLASS INDUSTRY

Abstracts of eight papers which appeared in the Russian journal of the glass and ceramic industries.

VISCOSITY OF SODIUM LEAD GLASSES

Some experimental data published by M. M. Skornyakov in a (Russian) book on sodium lead silicates (1949) were recalculated by M. V. Okhotin, *Steklo i Keramika* (Glass and Ceramics) 1951, No. 6, p. 5.

In glass containing 50 molecular per cents of SiO_2, x molecular per cents of PbO and 50-x molecular per cents of Na_2O, the viscosity of the melt depends on x and temperature according to the relation

$$t = a + bx.$$

In it t is temperature in °C. at which the viscosity has a predetermined value, and a and b are two constants. Their values depend on viscosity as follows:

Viscosity in poises	a	b
100	718	1.23
1000	587	1.72
10000	499	2.32

For instance, a glass containing SiO_2 50, PbO 37 and Na_2O 23 mol.% has viscosity of 100 poises at $(718 + 1.23 \times 37)° = 764°$C., viscosity of 1000 poises at $(587 + 1.72 \times 37)° = 651°$C., and viscosity of 10000 poises at $(499 + 2.32 \times 37)° = 585°$C.

DETERIORATION DURING STORAGE AND CHEMICAL COMPOSITION OF GLASS

According to M. A. Bezborodov and L. A. Zhunina, *Steklo i Keramika* (Glass and Ceramics) 1951, No. 6, p. 3-5, the chemical endurance of window glass during storage can be expressed by an "instability indicator" Δ. The value of this indicator depends on the chemical composition of glass as shown by the equation

$$\Delta = (Na_2O) + (K_2O) + (MgO) - (Al_2O_3) - (Fe_2O_3).$$

(Na_2O) is the percentage of Na_2O in the glass, and the other abbreviations have analogous meanings.

Glass can be stored without special precautions as long as Δ is less than 16.5. When Δ is greater than 18.0, glass can be stored only in dry surroundings. An intermediate group includes glasses having Δ between 16.5 and 18.0.

METALLURGICAL SLAG AS RAW MATERIAL FOR GLASS FABRICATION

M. K. Nekrich and I. V. Borovikov suggest, in *Steklo i Keramika* (Glass and Ceramics) 1951, No. 9, p. 10, to use alkali slags as an intermediate in the manufacture of glass. These slags are obtained in the process of desulfurizing molten iron by the action of sodium carbonate and carbon in the reaction

$$FeS + Na_2CO_3 + 2C = Fe + Na_2S + 3CO.$$

Sodium sulfide formed in this reaction and many other impurities produce a layer on the surface of the molten metal. After heating, the slag used by Nekrich and Borovikov had the following composition: SiO_2 34.9, Fe_2O_3 2.1, Al_2O_3 5.3, CaO 4.3, MgO 5.4, MnO 8.1 and Na_2O 39.9%.

It is seen that, in comparison with customary glasses, the slag contained too much sodium and too little lime and silica. To produce a suitable batch, 100 parts of this slag were mixed with 150 parts of sand, 20 parts of limestone and 10 parts of sodium sulfate. This batch was heated for 6 hours up to 1380°C. The resulting glass had the composition SiO_2 69.22, $Al_2O_3 + Fe_2O_3$ 3.20, CaO 5.80, MgO 2.06, Na_2O 16.65 and MnO 3.06 (as difference).

The viscosity and the tendency to devitrification of this glass were not significantly different from those of the usual bottle glass. The resistance to vapor of hydrochloric acid was greater for the experimental than for the regular glass. However, the new glass was almost black. Thus, it can be used only for anti-actinic bottles. The main advantage of the new glass lies in the cheapness of the raw materials.

COMPARISON OF BRIQUETTED AND LOOSE BATCHES

In *Steklo i Keramika* (Glass and Ceramics) 1951, No. 5, p. 7-9, M. A. Khachvankyan published some observations on the comparative advantages of batches in powder and in briquet form. Unfortunately, the composition of the batch is not given. It is stated only that sodium in it was originally present as sodium carbonate and the amount of CO_2 was 17.6%.

Experimental meltings in a pot showed that glass formation and fining were as rapid in the instance of powder as in that of fresh briquets. When aged briquets were used (i.e., those kept for many weeks in air), fining took 13% more time than usual because aged briquets contained $NaHCO_3$ and evolved CO_2 on heating.

There was no difference between the heat conductances of batch powder and briquets. This was shown by the following experiments: A heat-insulated ceramic cylinder (diameter 23 cm., height 16 cm.) was filled with powdered or briquetted batch, placed on a plate cooled with tap water and covered with a lid heated to 800° or 900°C. Thermocouples were inserted in the mass at four different levels. Their readings were almost identical for the two states of the batch.

When placed in a furnace, the briquets melt on the surface. The liquid glass thus formed was not imbibed by the rest of the briquet, but rather flowed down its sides. This exposed another layer of the briquet and so on, and thus was a useful effect. To intensify it, briquets should be piled up on the glass surface.

RADIATION IN MOLTEN GLASS

V. V. Rodnikova discusses, in *Steklo i Keramika* (Glass and Ceramics 1951, No. 4, p. 9-12, the paper by Hall and Turner published in the *Journal of the American Ceramic Society* 1945, No. 131, p. 5.

Hall and Turner found that, in a small laboratory furnace, the temperature of molten dark green glass was near the surface higher and in deep layers lower than the temperature of colorless glass at identical levels. They attributed this difference to the greater absorption of heat radiation from the crown of the furnace in the darker glass. Rodnikova maintains that this difference was due above all to absorption of radiation *originating in the*

glass itself, this absorption being greater, of course, in the darker glass.

Rodnikova's reasoning runs as follows: If from the experimental data of Hall and Turner the vertical temperature gradients Δ in the glass mass are calculated, it is found that they depend on temperature in significant manner. In the colorless glass they decrease when temperature rises from 8.8 degrees C. per cm. at 850° to 4.0 degrees C. per cm. at 1200°C. In the dark green glass they increase from 28 degrees/cm. at 850°C. to 37 degrees/cm. at 1200°C. Extrapolation of the two curves shows that the two Δ would become identical at 300°C. A very similar effect was observed by Rodnikova, see *Steklo i Keramika* (Glass and Ceramics) 1949, No. 3, p. 10, when colorless and dark glasses were slowly cooled in the absence of any outside source of radiation (such as furnace ceiling). As the effect (i.e., the temperature coefficient of Δ in dark glasses being positive and in colorless glasses being negative) occurs in the absence of an external source of radiation, it must be due to radiation within the glass mass itself.

SURFACE TENSION OF VERY VISCOUS GLASS

M. V. Okhotin and I. G. Bazhbeuk-Melikova in *Steklo i Keramika (Glass and Ceramics)* 9, No. 4, p. 12 (1952) describe a new method of measurement of the surface tension of glasses which are too viscous to flow freely. The method employs heating of a freely hanging glass thread.

Two quantitative variants of this method were known before.

(1) A vertical thread, on which equidistant marks are made, is uniformly heated over all its length. The distances between the marks gradually increase near the point of suspension and decrease near the bottom end of the thread, because the gravitational force is greater than the surface tension force in the upper, and smaller in the lower part of the thread. Somewhere in the middle of the thread two marks do not change their relative distance. In this point, the surface tension forces are just compensated by the weight of the thread below the point. Hence, surface tension σ is

$$\sigma = rx\delta g,$$

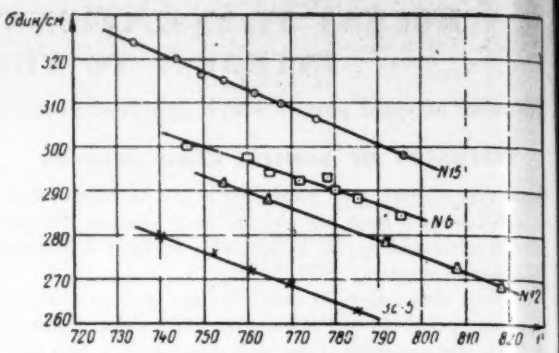
r being the radius of the thread, x the length of the thread below the unchanged stretch, δ density of the glass, and g acceleration due to gravity. This method is cumbersome as many divisions on the thread must be measured before x is found.

(2) A small portion of a vertical thread is heated. A swelling gradually forms on this spot. If r_1 is the radius of the swelling,

$$\sigma = \frac{r^2 x\, \delta g}{r_1},$$

the other letters having the above meanings. However, the equation is theoretically unsound.

In the new method, a fraction of the freely hanging thread is heated near the point of suspension, and the total length of the thread is measured by observing its bottom end with a traveling microscope. As the heating temperature increases, this length first increases because of the thermal expansion, then decreases because of surface tension, and increases again because a swelling formed in the heated spot and the thread is extended



above the swelling. If F is the mass of the thread from the point above the swelling to the bottom end of the thread, then

$$\sigma = \frac{gF}{\pi r}$$

is the surface tension at the temperature at which the length starts increasing again.

Glass threads 0.17 to 0.27 mm. in diameter and 100-140 mm. long were used. The atmosphere around them was kept dry by a silica gel. The heated portion was about 4 cm. long. For three of the four different glasses studied, the composition was known:

	Na_2O	CaO	MgO	Al_2O_3	SiO_2
N 6	16	8	3	1	66
N 12	16	6	1	3	74
N 15	13.5	8	3	1	74.5

the remaining constituents are not stated.

The fourth was a commercial glass.

The results are shown in the graph. Surface tension σ is expressed in dynes/cm, and the temperature (along the abscissa) is in °C.

THE TRANSPARENCY OF GLASS

K. T. Bondarev points out in *Steklo i Keramika* (*Glass and Ceramics*) *9*, No. 5, p. 3, that the degree of transparency of glass depends on its degree of oxidation which varies with the manner and duration of glass melting.

Thus, a glass consisting of SiO_2 71.8, Al_2O_3 1.2, Fe_2O_3 0.1, CaO 12.0, MgO 0.1, Na_2O 13.2, K_2O 1.0, and Sb_2O_3 0.6% was kept in the pot in which it had been made for 14 days at a high temperature. The light transmission of a 1 cm. thick layer was

after	1	3	6	10	14	days
	87.2%	87.3%	86.6%	85.2%	84.4%	

This gradual loss of transparency was due to the partial reduction of Fe_2O_3 to FeO. Glass containing 0.06% FeO was approximately as dark as glass containing 0.1% Fe_2O_3.

Glass of the composition SiO_2 71.8, Al_2O_3 1.2, Fe_2O_3 0.1, CaO 12.0, MgO 0.1, Na_2O 14.2, SO_3 0.4, and F 0.5% was prepared once in a glass tank and another time in a pot. The first glass had the ratio $FeO/(FeO + Fe_2O_3) = 0.68$ and light absorption along 1 cm. 10.3%, while the glass from the pot had $FeO/(FeO + Fe_2O_3) = 0.43$ and light absorption of 7.7%. Presumably, the longer sejour of the

(*Continued on page* 40)

Inventions and Inventors

Feeding and Forming

Blown Glassware. Patent No. 2,619,774. Filed February 10, 1950. Issued December 2, 1952. Two sheets of drawings, none reproduced. Assigned to Emhart Manufacturing Co. by George E. Rowe.

The object of this invention is to provide an improved device that will operate a plurality of the settle blow and baffle heads simultaneously with respect to the molds of a double or plural gob forming machine. The patent is an extension of the co-pending patent application serial number 103,903 filed July 9, 1950 and serial number 144,720 filed February 16, 1950 by George E. Rowe. A detailed study of the many drawings is needed to understand the improvements for the well known "Hartford I. S. Machine."

The patent contains six claims and the references cited were 1,197,837, Loper et al, Sept. 12, 1916; 1,590,423, Cramer, June 29, 1926; 1,654,731, Ingle, Jan. 3, 1928; 1,941,983, Rowe, Feb. 6, 1934; and 2,235,103, Garwood, Mar. 18, 1941.

Furnaces

Glass Melting Furnace. Fig. 1. Patent No. 2,618,906. Filed September 14, 1945. Issued November 25, 1952. One sheet of drawings. Assigned to Selas Corporation by Frederic O. Hess.

The control of temperature in the forehearth and feeders of glass tanks is highly important. An improved technique is shown in Fig. 1.

In order to control the viscosity of the molten glass and maintain the glass at the precise desired temperature at the delivery bowl or spout, a radiant heating zone is maintained directly above the feed outlet. In Fig. 1 molten glass is introduced into the channel or forehearth 10 at an inlet 11. The channel 10 extends from the tank proper to the glass delivery bowl 14 at the outlet end of the channel. The forehearth 10 is provided with a removable roof 27 comprising a horizontally disposed refractory wall section 28 made of a plurality of burner blocks. The molten glass 26 in the channel 12 is therefore heated by radiant heat directed downwardly from a plurality of radiators 33 embodied in the refractory wall section 28. The radiators 33 are cup-shaped and of parabolic form and thus provide a radiant type of heat to the glass. The temperature can be carefully controlled and thus deliver glass at the same high temperature to the delivery bowl 14. The radiant heat can be applied directly all along the channel member and thus heat the entire forehearth.

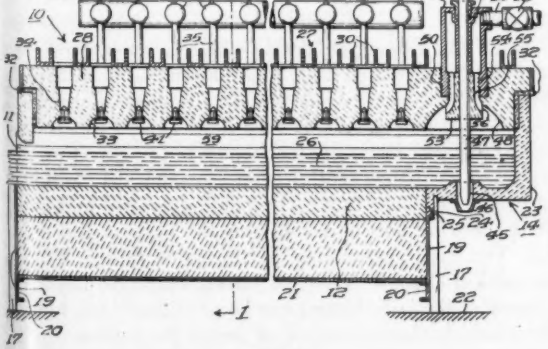


Fig. 1.

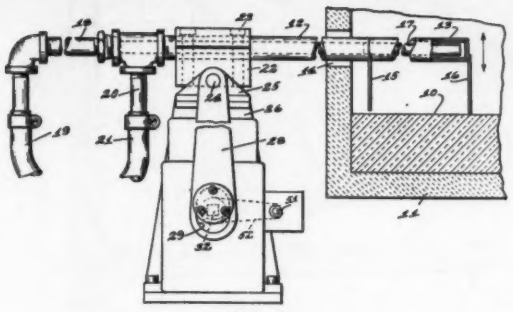


Fig. 2.

The patent contains two claims and 12 references were cited.

Glass Level Recording Mechanism. Fig. 2. Patent No. 2,613,443. Filed July 13, 1948. Issued October 14, 1952. Two sheets of drawings. Assigned to Owens-Illinois Glass Company by Marion A. Helmick.

An apparatus for gauging and recording the level of molten glass in a tank is described in Fig. 2. A pair of probes 12 and 13 mounted side by side extend horizontally through the wall of a glass tank 11. The forward end of the probes are connected with feelers 15 and 16. The feelers are preferably made of platinum wires and serve as electrodes. The probes are mounted in a split bearing block 22 and are designed to permit the circulation of water for cooling.

When the level of the glass in the tank is normal, the long electrode 16 is in contact with the glass and the short electrode 15 is out of contact. If the level of the glass rises so that short electrode 15 contacts the glass, the motor (not shown) is automatically started and raises the probe until electrode 15 is lifted out of contact with the glass and the motor is again stopped. If the glass level falls below normal so that both electrodes are out of contact, then the motor is started in the "down" direction so that the probes swing downward until the long electrode 16 again contacts the glass and the motor is stopped. Because a small movement of the motor serves to readjust the position of the electrodes relative to the glass level, the position of the motor rotor substantially corresponds at all times to the level of the glass. In order to maintain the glass at a constant level, the speed of the motor driving the batch feeder is controlled by the position of the probes providing more raw batch or less batch to the tank as needed. The details of the various circuits are explained in many drawings included in the patent.

The patent contains 12 claims and the following references were cited: 1,941,897, Hiller, Jan. 2, 1934; 2,032,016, Hitner, Feb. 25, 1936; 2,110,313, Warrick, Mar. 8, 1938; 2,297,680, Alling, Oct. 6. 1942; 2,331,354, Stout, Oct. 12, 1943; 2,380,436, Holdman, July 31, 1945; and 2,394,220, Wagner, Feb. 5, 1946.

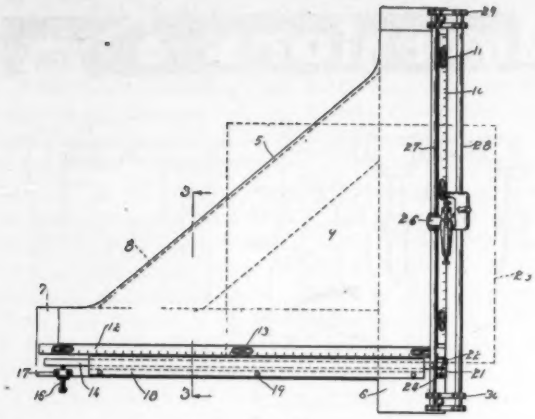


Fig. 3.

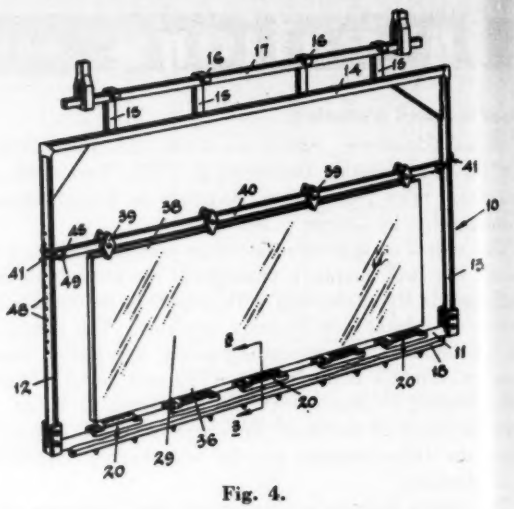


Fig. 4.

Sheet and Plate Glass

Glass Cutting Board. Fig. 3. Patent No. 2,619,775. Filed October 1, 1949. Issued December 2, 1952. One sheet of drawings. Assigned to The Fletcher-Terry Company, by Chester K. Judd, Jr.

This invention is an extension of Patent No. 2,534,775 and provides a glass cutting board that will maintain accuracy and squareness even after rough usage. It is also easily adjusted and provides an improved means for accurately measuring a glass sheet on the board.

The board as shown in Fig. 3 comprises a frame 6 and 7 upon which is mounted a flat plate 9 providing supporting surface for the glass sheet to be cut. Measuring bars 10 and 12 are provided with means for vertical and lateral adjustments. A breaker member 21 is mounted adjacent to the lower edge of the board. The glass positioning bar 14 is adjustable and thus provides means for readily squaring the positioning surface of this bar with the line of cut made by the glass cutting wheel on the head 26 so that square cuts may be made on the glass sheets. The measuring bars 10 and 12 are slightly thinner than the plate 9 and the breaker edge is located on a plane slightly above the surface of the plate 9. A sheet of glass thus placed as indicated by line 23 will rest upon the breaker edge 22 and thus prevent wear on the bars that would ultimately impair the visibility of the graduations on the measuring bar.

The patent contains five claims and the references cited were: 453,867, Monce, June 9, 1891; 890,181, Royle, June 9, 1908; 1,115,333, Pease, Oct. 27, 1914; 1,117,736, Whittemore, Nov. 17, 1914; 1,649,282, Bishop, Nov. 15, 1927; 2,174,183, Shaw, Sept. 26, 1939; and 2,174,469, Levin, Sept. 26, 1939.

Holders for Tempering Glass. Fig. 4. Patent No. 2,618,905. Filed August 16, 1949. Issued November 25, 1952. Two sheets of drawings. Assigned to Libbey-Owens-Ford Glass Company by Norman A. Dicks and Benjamin A. Schultz.

A novel frame construction is shown in Fig. 4 that provides a means of securely supporting heavy sheets of plate glass during the heating and cooling operations employed in tempering. One or more glass sheets may be supported without marring the surface of the glass while, at the same time, free expansion and contraction of the sheet is permitted.

The rectangular frame 10 is carried by vertical hangers 15 and suitably secured to the top member 14. The bottom horizontal member 11 is preferably of relatively light tubular cross-section to reduce heat absorption. Along the bottom member 11 are a plurality of glass sheet supporting members or blocks 20, each of which is made up of three super-imposed, slidably associated sections 21, 22 and 23 (not shown). These sections are formed of a refractory material like "Marinite." When placing a sheet of glass 29 on the frame 10, the plurality of blocks 20 spaced along the bottom member 11 may be adjusted to raise or lower the top section 23 (not shown) until the glass sheet is uniformly supported. The upper marginal portion 38 of the glass sheet 29 is received between a plurality of pairs of retaining elements 39, also of refractory material similar to blocks 20. The retaining elements 39 are substantially diamond shaped to provide sharply convergent end portions.

The patent contains three claims and the references cited were: 2,009,431, Black, July 30, 1935; 2,019,595, Black, Nov. 5, 1935; 2,062,567, Forbes, Dec. 1, 1936; 2,239,535, Minton et al., Apr. 22, 1941; 2,343,490, White, Mar. 7, 1944; 2,379,213, Black, June 26, 1945; 2,379,244, Minton, June 26, 1945; and 2,388,809, White et al., Nov. 13, 1945.

Tube and Cane Machine

Sealing of Fluorescent Lamps. Fig. 5. Patent No. 2,618,903. Filed July 12, 1950. Issued November 25, 1952. Three sheets of drawings. Assigned to General Electric Company by Robert A. Kuebler.

In the manufacture of electric lamps, it is necessary to provide for exhausting and sealing-off of the glass envelope. The tipping-off device which is an integral part of a rotary turret machine (not shown) is illustrated in Fig. 5. This device comprises a pair of gas burners 11 and 12 which are mounted on a head 13 and which have upwardly and inwardly inclined jets for directing the flames to a common central point. The upward movement of piston 24 results in a corresponding upward movement of the floating portion comprising the burners and guide 14. The upper extremities of the guide fingers 14' are spread out enough so that no matter where the lower extremity of the lamp happens to be positioned it will strike the inwardly sloping surface of one of the fingers. Immediately thereupon, the upper floating portion of the tipping-

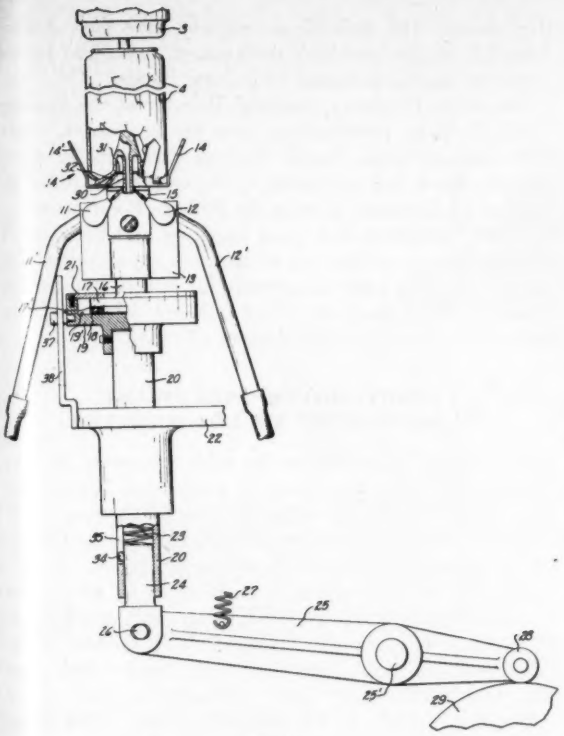


Fig. 5.

off device will shift sideways by movement of the disc 17 over the upper surface 19′ of housing 19. The lateral movement will continue while the tipping-off device is moving upwardly until finally the lower end of the lamp is seated squarely within the flared guide 14. The melting of the glass and the sealing of the exhaust tube 30 is brought about by the action of the relatively hard flames from the burners 11 and 12.

The patent contains nine claims and the references cited were: 2,262,760, Gardner et al., Nov., 18, 1941; and 2,336,678, Gardner et al., Dec. 14, 1943.

Miscellaneous Processes

Anti-fogging Goggles. Patent No. 2,612,640. Filed September 2, 1949. Issued October 7, 1952. One sheet of drawings, none reproduced. Assigned to United States Government by Edward D. Palmes.

Goggles for use in cold weather that will not fog have been the object of this invention. The structure is quite complicated and condensation of moisture on the lenses is prevented by the use of metallic moisture condensing surfaces of high heat conductivity. These surfaces are placed intermediately between the eyes of the wearer and the lenses. At the same time, they do not seriously interfere with the vision of the wearer. Condensation of moisture on the lenses is also prevented without unduly chilling the eyes.

The patent contains eight claims and the references cited were: 1,947,137, Fraser, Feb. 13, 1934 and 2,195,175, Kimball, Mar. 26, 1940.

Anti-fogging Goggles. Fig. 6. Patent No. 2,612,639. Filed June 8, 1949. Issued October 7, 1952. One sheet of drawings. Assigned to United States Government by William R. Christensen and Chester E. Cross.

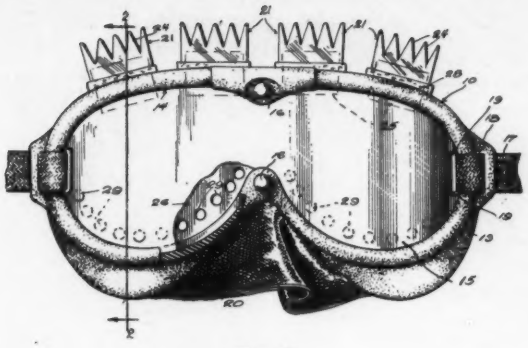


Fig. 6.

Anti-fogging and anti-frosting goggles of the double-lens type are described. As illustrated in Fig. 6 there is attached across the top of the goggles frame 10 a series of condensers 21. The condensers 21 comprise rectangularly-shaped box-like housings. The upper portions of the front and back walls are serrated and a serrated cover plate 24 is joined thereto by a rubber adhesive.

When the goggles are adjusted against the face, moisture laden air flows by convection from the eye-cup cavities to the rear of the transparent partition 26 into the condensers 21 where it contacts the heat-conductive, serrated top 24 and deposits moisture as it passes over partition 25 and 25′ (not shown) in the condenser. The semi-dried air passes downwardly through the condenser and into the space between the lens 15 and the transparent partition 26. Since the air which passes downwardly between lens 15 and the transparent partition 26 has been cooled and relieved of moisture, frosting of the lens is prevented.

The patent contains three claims and the references cited were: 1,670,638, Shindel, May 22, 1928 and 2,149,514, Fischer, Mar. 7, 1939.

Silvering of Mirrors. Patent No. 2,614,943. Filed July 11, 1949. Issued October 21, 1952. No drawings. Alfred M. Franza.

An improved method of silvering glass for mirrors is described. The method is best understood from the claim presented:

"The method of making mirrors which are resistant to deterioration for many years consisting essentially of admixing 7 parts, by weight, of a filtered solution composed of 1 pound of silver nitrate and 12 ounces of 26 Baume ammonia water in 192 ounces of distilled water, with 7 parts, by weight, of a filtered solution composed of 4 pounds of Rochelle salt in 2 gallons of distilled water and with 3 parts, by weight, of a filtered solution composed of 2 ounces of tartaric acid and 7 ounces of aqueous ammoniacal copper sulfate in 1 gallon of distilled water, the ammoniacal copper sulfate having been previously prepared by dissolving 4 ounces of crystalline copper sulfate and 6 ounces of 26 Baume ammonia water in 1 gallon of distilled water, and applying the admixture to a previously prepared glass surface, the method being carried out at room temperature without heat application."

The patent contains one claim and the references cited were: 201,497, Carney, Mar. 19, 1878; 1,208,507, Dalby, Dec. 12, 1916; 1,588,510, Wear, June 15, 1926; 1,935,520, Peacock, Nov. 14, 1933; and 1,982,774, Winkler et al., Dec. 4, 1934.

GLASS INDUSTRY SAVINGS BOND PROMOTION

The Glass Industry Advisory Committee on Payroll Savings has organized a 1952-53 drive to promote a U. S. Defense Bond Payroll Savings Plan among employees of the many companies comprising the glass industry. In the decision to promote another campaign, the committee reiterates its confidence in the Defense Bond program as an ideal means of encouraging thrift among industrial employees.

H. R. Winkle, Vice President of the Owens-Corning Fiberglas Corporation and Chairman of the Advisory Committee, set forth the committee's confidence in the program in a communication to the industry. He wrote: "The committee is of the opinion that the nation will be benefited and strengthened economically by the fullest cooperation of all industry in aiding the Treasury to directly distribute its obligation among wage earners.

"The Payroll Savings program encourages the spirit of thrift among employees and demonstrates by its systematic savings from wages that thrift is possible for all. Ownership of Savings Bonds tends to alert in the individual a sense of partnership and an interest in the monetary affairs of the nation which is so vital in the democratic processes.

"The Nation benefits by partially raising funds to meet its obligations without recourse to the banking system, which increases the inflationary trend.

"Will you kindly advise me promptly as possible of your willingness to have your company participate in this drive, and also advise me the name of the individual who will handle the details."

The 1952-53 Payroll Savings drive is the third of its kind to be undertaken by the Glass Industry Advisory Committee. The first was in 1950 when 28 plants reported a total employee participation of 27 per cent. In 1951, total participation in 37 plants jumped to 35 per cent, with a total monthly payroll deduction of $527,493. Committee chairmen for those drives were: 1950, John McNerny, Treasurer of Owens-Illinois Glass Company; 1951, Carl Cazayonx, Treasurer of Libbey-Owens-Ford Glass Company. At the close of these drives, each committee chairman received a personal letter of commendation from Secretary of the Treasury John W. Snyder.

Members of the 1952-53 Glass Industry Advisory Committee for Payroll Savings are: Mr. Winkle; J. P. Levis, Chairman of the Board of Owens-Illinois Glass Company; Amory Houghton, Chairman of the Board of Corning Glass Works; John D. Biggers, President of Libbey-Owens-Ford Glass Company; Harry B. Higgins, President of Pittsburgh Plate Glass Company; William V. Fisher, President of Anchor Hocking Glass Corporation; and Harold Boeschenstein, President of Owens-Corning Fiberglas Corporation.

The glass industry was among the first to set up industry-wide promotional campaigns for the purpose of providing employees with the opportunity of signing up, voluntarily, for the Payroll Savings Plan in their respective plants. The individual company may then deduct from his weekly paycheck the amount authorized by an employee for the purchase of Defense Bonds.

Merrill L. Predmore, National Director of the Savings Bond Division, commenting upon the new drive, said: "The industry-wide Payroll Savings drives in the glass industry are a real indication of the confidence forward-looking businessmen have in the Defense Bond program. A thrifty employee is a good employee and the Payroll Savings plan provides one of the best opportunities for that employee to build up security for himself and for his country. Members of the Glass Industry Advisory Committee for Payroll Savings deserve all credit."

LIBBEY MOVES TABLEWARE MANUFACTURE TO LOS ANGELES

Libbey Glass is producing its table glassware in Los Angeles, the first expansion of production beyond the home plant in Libbey's 134-year history. The new facilities will be housed in the Los Angeles plant of the Owens-Illinois Glass Company, the parent organization.

Libbey's move West was brought about by its steadily expanding business in the Pacific area, explained William M. Beckler, General Sales Manager. With the new facilities, it will be able to provide faster service and other advantages to its West Coast customers, he said.

The market area to be serviced includes West Coast states, Canada, and the South Pacific. At the start, the principal products of the new outlet will be heat-treated glassware for restaurants and institutions and decorated table glasses for home use. The plant will have facilities for applying ceramic crests and other glassware decorations.

BALL APPOINTS JOHN FISHER TO DIRECT SALES

Ball Brothers Company has announced the appointment of John W. Fisher as Director of Sales for the company's Commercial Glass Container Division. In accepting the new directorship, Mr. Fisher, a Vice President, member of the Board of Directors, and a manufacturing executive for nearly 12 years, moved from a key position in manufacturing to another in sales.

Mr. Fisher was Vice President in charge of metal closure manufacturing and zinc rolling mill and fabrication operations at the time he was chosen for the commercial container sales position, and for several years before his Metals Division assignment, he was in charge of all Ball plants as Vice President in charge of Manufacturing.

In his new capacities, Mr. Fisher will report to the company's chief operating officer, Duncan C. Menzies, Executive Vice President and General Manager, who said that the new Sales Director would be responsible for the administration and execution of sales policies and for coordinating the sales activities of all Ball Brothers' commercial container divisions, including those at Muncie, El Monte, California, and Okmulgee, Oklahoma.

• Open meetings of the Association of Consulting Chemist and Chemical Engineers, Inc., for 1953 are: April 21, 1953, Hotel Belmont Plaza, New York City, Symposium and Dinner; October 27, 1953, Hotel Belmont Plaza, New York City, 25th Anniversary and Annual Meeting.

COLOR PROBLEMS

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Some Common Sources and Causes of Stones in Glass from Continuous Melting Furnaces

Stones, including knots, surface cords, and color streaks, occurring in glasses from continuous furnaces constitute a loss of production ranging from 0.1 to 10%. Occasionally there is a total loss of production.

A. K. Lyle (*Bulletin of the American Ceramic Society*, July 1952) summarizes a collection of case histories of stones and related imperfections found in glass and derives a few general statements which may be considered by some as over-simplification of a complex subject, but which, nevertheless, it is hoped, can be applied to the identification or the solution of problems involving loss of production caused by stones in glass.

There are four factors that influence the attack of refractories and formation of stones: (1) temperature, (2) chemical activity of the attacking medium, (3) time, and (4) shearing or tension force. There may be others, but for simplicity these are all that need to be considered. All of these are subject to wide variation and to some extent are controllable.

(1) Temperature is the most obvious and, in many instances, the most important factor, although its effect may be considered in either of two ways. Sometimes temperature is increased following occurrences of stones on the theory that stones already formed can be dissolved and thus prevented from reaching the finished product. At other times, it is thought best to decrease the temperature in order to improve the firing conditions and to eliminate reducing conditions that are very destructive to refractories. Generally, however, solution of refractories and possibility of stones are increased with increase in temperature.

(2) Chemical activity of the attacking medium at first might appear a roundabout way of saying "glass," but the available evidence indicates that the glass in the tank is very seldom a direct constituent of stones. Primary attack of refractories above the glass level may be either by batch dust, particularly soda ash and lime, or by the volatile constituents of the glass, such as sodium, potassium, sulfur, fluorine, and boron compounds. The extent of attack or refractories below the glass line and at the glass line is dependent on the batch materials and on the composition of the glass.

(3) Time, as a factor in formation of stones, simply refers to the fact that stones generally decrease in size and may dissolve completely if sufficient time is allowed. The degree of solution, or reaction, is very useful to the petrographer in locating the probable source of stones.

(4) Shearing or tension force is probably new to many, although it will be recognized as being an obvious factor and of major importance in formation of stones when its meaning is explained.

Consider a small portion of refractory in the superstructure of a furnace under chemical attack by alkali vapor or batch dust. As soon as the attack has progressed far enough to form a mixture of viscous liquid (glass) and solid pieces, it will begin to flow under the face of gravity, minus only the very small buoyant effect of the furnace atmosphere. If it breaks loose entirely from other refractory and falls into the bath of glass, it is very likely to become a stone in finished ware. If the potential stone is part of a side wall, its fall may be retarded by adherence to the wall as it slides downward to the glass, but this involves only a delay in time and a resulting greater degree of solution. Stalactites from the crown and overhanging ledges of tuckstones are obvious sources of stones formed and torn loose by almost full force of gravity.

Consider also a small portion of refractory at the surface of a tank block beneath the glass level. Attack by the glass may be as severe as by alkali in the superstructure and the temperatures may be nearly as high, but there is very little net force to pull a refractory stone from the surface of the block because of the buoyant effect of the surrounding glass. The result is that the potential stone remains in place and continues to dissolve without causing appreciable harm to the finished product. There is considerable support of this theory in the reports of almost complete lack of stones from electric melting furnaces which have no superstructures.

A special consideration of the factor of force in forming stones concerns the throat of the furnace. It might be thought that the flow of glass through the throat would account for enough force to dislodge stones, but when it is realized the average velocity in a throat is usually less than one foot per minute, this does not seem to offer an adequate explanation. It is certain that the flow of glass through the throat increases the temperature compared to other portions of the furnace at the same level.

Actually, there are several conditions peculiar to the throat which in combination probably account for the likelihood of stones. In addition to higher temperature, these are (1) exposed corners of refractories, (2) downward facing surfaces, and (3) the pressure of molten glass at approximately 2 lb. per sq. in. All of these conditions accelerate solution of refractories and increase the probability of stones. Once stones are formed in the region of the throat, they are quickly cooled as they float into the nose of the furnace and, consequently, they persist in finished ware.

From consideration of the four factors of formation of stones, we may conclude that superstructure refractories represent the only serious problem. In this area, the chemical attack may be considered as being entirely from alkali volatilized from the glass.

The final factor in formation of stones is the furnace atmosphere. Actually, the difference between a small excess of fuel and a small excess of air in the furnace atmosphere may be the determining factor in formation of stones. This applies not only to average or net results, but to local conditions as well. If fuel or unburnt gas comes in contact with superstructure refractories, the refractories will deteriorate rapidly. Refractories about the ports of cross-fired furnaces and the shallow walls of end-fired furnaces are particularly susceptible to destruction by impingement of fuel or unburnt gases.

A reducing atmosphere in contact with refractories of the superstructure of a glass melting furnace, plus high temperature, volatilized fluxes, time insufficient to effect complete solution, and the force of gravity, constitute a combination of conditions that will almost certainly pro-

(*Continued on page* 42)

Current Statistical Position of Glass

Employment and payrolls: During October 1952, employment in the glass industry rose slightly and was reported at a preliminary 133,100. This is .4 per cent above the adjusted 132,500 employment during September. During October 1951, employment was 129,000, which is 3.1 per cent less than for October 1952.

Payrolls during October 1952 also continued on the upgrade and were reported at a preliminary $41,446,453. Compared with the previous month's adjusted payrolls of $39,801,233, a rise of 4.1 per cent is shown. During October 1951, payrolls were $36,832,510, which is 12.5 per cent less than for October 1952.

Glass container production, based on figures released by the Bureau of Census, fell off somewhat during November 1952 to reach 8,888,046 gross. Compared with the previous month's 10,704,172 gross, a drop of 16.9 per cent is indicated. During November 1951, production of glass containers was 7,804,302 gross, or 13.8 per cent less than for November 1952. Thus far in 1952, glass container manufacturers have produced a total of 107,380,971 gross. This total for the first time during 1952 surpasses 1951 production, which was 100,747,929 gross for the same period. 1952 production is now ahead of 1951 by 6.5 per cent.

Shipments of glass containers during November 1952 also fell off and were 8,545,981 gross. This is 17.6 per cent off from the 10,375,390 gross shipped during October 1952. Glass container shipments during November 1951 were 7,925,815 gross, or 7.8 per cent less than for November 1952. Total glass container shipments at the close of the eleven months ending November 1952 have reached 106,028,950 gross. This total brings 1952 shipments right behind 1951 shipments for the corresponding period. At the end of November 1951, shipments were 106,967,342 gross—a difference of .8 per cent.

Stocks on hand at the close of November 1952 were 10,086,751 gross, a rise of 2.3 per cent over the 9,853,623 gross on hand at the end of October 1952 and 3.8 per cent over the 9,709,581 gross on hand at the end of November 1951.

Due to a delay in the compilation of figures showing the production, shipment, and stocks of automatic tumbler ware and manufacturers' sales of machine-made table, kitchen, and household glassware for November 1952, THE GLASS INDUSTRY is unable to publish these statistics in this issue. It is planned to include these data in this department in the February 1953 issue.

GLASS CONTAINER SHIPMENTS

(All Figures in Gross)

	November, 1952
Narrow Neck Containers	
Foods	719,451
Medicinal & Health Supplies	1,030,490
Chemicals, Household & Industrial	626,678
Beverages, Returnable	302,184
Beverages, Non-returnable	27,351
Beer, Returnable	53,094
Beer, Non-returnable	474,635
Liquors	1,031,317
Wines	349,632
Toiletries & Cosmetics	568,080
Sub-total (Narrow)	5,182,912
Wide Mouth Containers	
Foods	*2,085,290
Dairy Products	270,423
Medicinal & Health Supplies	346,320
Chemicals, Household & Industrial	124,408
Toiletries & Cosmetics	138,207
Packers' Tumblers	148,767
Sub-total (Wide)	3,113,415
Total Domestic	8,296,327
Export Shipments	249,654
TOTAL SHIPMENTS	8,545,981

*This figure includes Home Canning.

GLASS CONTAINER PRODUCTION AND INVENTORY

(All figures in Gross)

		Production November 1952	Stocks November 1952
Foods; Medicinal & Health Supplies; Chemicals, Household & Industrial; Toiletries & Cosmetics	Narrow Neck	3,117,203	3,626,167
	Wide Mouth	*2,816,323	*3,286,210
Dairy Products		274,789	314,081
Beverages, Returnable		446,039	760,726
Beverages, Non-returnable		33,497	67,190
Beer, Returnable		138,328	248,381
Beer, Non-returnable		420,494	505,857
Liquors		1,086,206	772,072
Wines		397,602	348,950
Packers' Tumblers		157,565	157,117
TOTAL		8,888,046	10,086,751

*This figure includes Home Canning.

KAISER MAKES APPOINTMENTS

George C. Davis, Jr., has been named assistant general sales manager of the Chemical Division of Kaiser Aluminum & Chemical Sales, Inc., according to an announcement by Frank M. Cashin, General Sales Manager. J. T. Putnam, formerly Los Angeles District Sales Manager, will move into the newly-created position of Western Division Sales Manager and will maintain headquarters in Oakland, California.

Simultaneously, a new Central Sales Division, with headquarters in the Chicago area, has been established to handle increased sales volume of the company's basic refractories and chemicals. R. L. Petersen will be Sales Manager of this division.

INTERNATIONAL MINERALS ACQUIRES CONSOLIDATED FELDSPAR

In its continued program of expansion, International Minerals & Chemical Corporation has announced the acquisition of Consolidated Feldspar Corporation.

Consolidated Feldspar has fourteen plants in nine states and the Province of Quebec. It produces feldspar, mica, flint, aplite, beryl, lepidolite, spodumene, and tantalite, and owns what are probably the largest reserves of nepheline syenite on the continent.

C. P. Overmyer, Sr., presenting 25-Year Award to Earl M. Flatter in the presence of Mrs. Flatter.

Overmyer 25-Year Award recipients, with their wives and guests, at the Award banquet.

OVERMYER 25-YEAR AWARD BANQUET

Climaxing its sixth annual 25-Year Award presentations, Overmyer Mould Company so honored its Vice President, Earl R. Flatter. Mr. Flatter was among seven men who received the 25-year award at the recent banquet held commemorating the occasion.

The new 25-year men received engraved Hamilton wrist or pocket watches which were presented by C. P. Overmyer, Sr., President of the firm. In addition to Mr. Flatter, those men honored were Kenneth Grow, Elmer Mack, Edgar Payntor, William Laricks, William P. Morris, and Donald Smith of the Overmyer organization.

Seated at a special table were the 30-year men, the first group of five years ago to become members of the OMCO 25-year club. They were George Flanagan, Carl Flatter, and Glen Gartley. Donald Strahan, Sr., was absent.

As this issue of THE GLASS INDUSTRY was being made ready for press, the shocking news of Mr. Overmyer's death in an automobile accident was received.

OPS APPROVES 2% PRICE RISE ON CERTAIN FLAT GLASS ITEMS

The Office of Price Stabilization has authorized an industry earnings standard increase of 2 per cent in selling prices for manufacturers of rolled figures, heat absorbing, and wire glass. The action is covered by Supplementary Regulation 40 to CPR 22, effective December 23.

The commodities covered are the following types of flat glass: (1) rolled figured glass with a pattern embossed on its surface to give it the appearance of a roughened surface; (2) heat absorbing glass made to reduce glare and transmission of heat beyond the characteristics of ordinary glass, but not including laminated or "automobile" glass; and (3) wire glass of a polished or roughened surface containing a metallic mesh embodied in the glass.

The 2 per cent increase is to be applied to ceiling prices established under the general ceiling price regulation. In determining the increase, recognition was given to increased cost of crating and packaging materials, among other costs.

A.C.S. SECTION MEETINGS

The New York Section of the American Ceramic Society will devote its February 6 meeting to "Glass." Dr. W. W. Shaver of Corning will give a demonstration talk on "Glass Technology—Recent Developments." This will be followed by a talk on "Glass, Symbol of Infinite Variety," illustrated in color, by Dr. Alexander Silverman, Professor of Chemistry, Emeritus, in the University of Pittsburgh. A discussion period will follow.

At the November meeting of the Trenton Section, the following officers were nominated for 1953: *Chairman*, J. Talbot Smith, United Clay Mines Corp.; *Vice-Chairman*, Elmer Miller, Washington Porcelain Company; *Secretary-Treasurer*, Harry Barr, Consolidated Feldspar Corp.; *Counsellor*, Ogden A. Kantner, United Clay Mines Corp. These officers will be installed at the annual dinner dance to be held January 23.

The Pittsburgh Section of the A.C.S. will feature an "Enamel Night" at its February meeting. The members will be addressed by C. L. Van Derau, Works Manager of the Mansfield, Newark, and the New Columbus plants of the Westinghouse Electric Corporation. Mr. Van Derau's topic will be "Building for the Future."

MINNESOTA MINING FILES SUIT AGAINST GLIDDEN

Minnesota Mining and Manufacturing Company has filed suit against the Glidden Company for infringement of patents on a reflective highway striping compound.

The 3M company's suit seeks unspecified damages and an injunction to prevent further infringement. It was filed in U. S. district court of Minnesota in Minneapolis on November 21.

The suit charges infringement of U. S. patents 2,574,971 and 2,574,972 concerning a "highway marking paint containing glass beads"—a reflective highway striping compound made and sold by Minnesota Mining and Manufacturing Company under the trademark "Centerlite."

• The Spill Manufacturing Company, East Rutherford, New Jersey, manufacturer of sunglasses, has been sold to a group of New Jersey businessmen. The new owners plan to expand its present operations, acquire new facilities and equipment, and soon plan to move to a new building.

The trend is toward

MONOFRAX
FUSED CAST
refractories

This burner assembly — made of MONOFRAX H refractories — is one of six, located over the first three ports of an amber container tank.

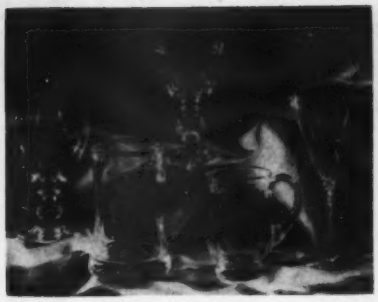
ONE PLACE TO REDUCE STONES and cords is right here. Volatilized alkalies, batch dust, and silica drip, all tend to attack crown burner blocks. Any chemical reaction, and the refractory starts to spall off into the glass. Another reason for refractory-caused defects can be erosion due to flame impingement. If the burner holes become enlarged, the flame pattern may shift enough to be destructive to other adjacent refractories.

The ideal material for this and other vulnerable superstructure locations is MONOFRAX H fused cast refractory. Containing over 99% beta alumina, MONOFRAX H refractory is chemically inert, and resistant to high heat and direct flame impingement. With less than 0.5% interstitial glass content, this product does not tend to bleed, "honey-comb," and spall. Eutectic formations are avoided, and there is little that can contaminate the glass or cause glass defects.

RECENTLY THE WORLD'S LARGEST glass furnace, operating on flat glass, broke all previous records of the plant for campaign life. This is all the more remarkable in view of the high production levels at which this furnace has operated — and continues to operate. MONOFRAX fused cast refractories used in the top course of the melting end helped make the new record possible.

CARBORUNDUM
Trade Mark
Dept. L-13 Refractories Division
The Carborundum Company, Perth Amboy, N. J.

"CARBORUNDUM" AND "MONOFRAX" ARE REGISTERED TRADEMARKS OF THE CARBORUNDUM CO. — WORLD'S LARGEST MANUFACTURER OF SUPER REFRACTORIES.



200 out of 755 products submitted have been approved as souvenirs of the Coronation of Elizabeth II. Among the items of "glass" interest are: Left to right, place mats and coasters made of glass, with the background in gold or other colors. Hand-screened multicolor decorations; Commemorative glasses of crystal, hand engraved; Coronation goblets of clear crystal, entirely handmade and hand-etched. These will be in a limited edition.

AMERICAN POTASH APPOINTMENT

The appointment of Parker S. Dunn as Vice President-Production of American Potash & Chemical Corporation has been announced by Peter Colefax, President.

Mr. Dunn will be in charge of production and engineering at the company's plant at Trona, California. He succeeds Russell W. Mumford, Vice President, who has been appointed consulting engineer in the company's Los Angeles office.

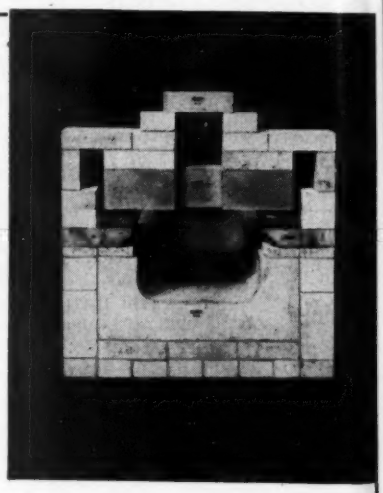
Mr. Dunn joined the firm as assistant vice president in 1951. Previously he served with the Potash Company of America for ten years, during the last five of which he was Resident Manager at Carlsbad, New Mexico. His earlier positions included Technical Director at Southern Alkali and service with Pittsburgh Plate Glass Company and the Mead Corporation.

POLAROID MAKES FILM AVAILABLE

Polaroid Corporation has announced the availability of a newly-revised edition of its 13-minute motion picture entitled "Light Control Through Polarization."

This new black-and-white version employs animation to diagram the nature of light and to show how Polaroid filters work in controlling reflections and cloud-contrast in photography, predicting the strength of mechanical structures, detecting strains in glassware and plastics, identifying crystals, sharpening vision in sports and military observation.

Cleaner Glass, Low Maintenance with **CRYSTALITE Forehearths**



REMMEY CRYSTALITE (mullite-bonded mullite) is produced in all shapes necessary to make up the forehearth assembly. Burner blocks, cover blocks, channels, spouts, tubes, plungers and orifice rings are built to meet specified requirements. These CRYSTALITE parts mean better, more efficient production by offering:

- ★ Accuracy in formation to eliminate time-wasting adjustments.
- ★ High refractoriness and erosion resistance for longer life, fewer replacement shutdowns and cleaner glass.
- ★ Rigid control through each production phase for uniform quality and dimension accuracy.

Get Premium Performance Without Premium Price . . . by using REMMEY CRYSTALITE parts for your forehearth.

Dependable Refractories

REMMEY

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Philadelphia 37 • Pennsylvania

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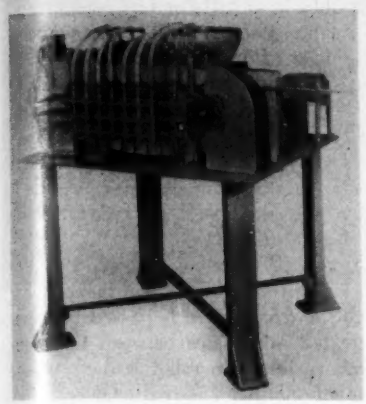


AUTOMATIC TUBE BOTTOMING MACHINE

Kahle Engineering Company, 1307 Seventh Street, North Bergen, New Jersey, has announced the production of a completely automatic tube bottoming machine. This special-purpose machine, Model 2048, was designed and built by Kahle to produce miniature lamp bulbs for switchboard and telephone use.

The machine, producing 4,000 units per hour, eliminates older methods of lifting the glass from one position to the next by using a continuous conveyor principle. Cut tubing of required length is dumped into a rubber-lined hopper. The glass is then indexed straight through the machine and is not "jumped" or "bumped" in the process. In-machine breakages and rejects are consequently held to a minimum. In addition, Model 2048 can be used to produce round or flat bottomed test tubes, vials, and containers.

MASONRY CUTTER

Eisler Engineering Company, Inc., 750 South 13th Street, Newark 3, New Jersey, has announced the development of a new type masonry cutter with improved fixtures. The machine is produced with cutting discs of 12", 14", and 16" diameter and can be used for dry or wet cutting. This cutting machine is suitable for cutting all kinds of material, hard or soft, such as glass bricks, ceramic bricks, ceramic tubing, cement blocks, or any other similar material.

The machine is a complete unit. The base of the machine is equipped with a water circulating pump and a water tank. The water circulating pump is operated by a separate motor built into the housing of the machine. The glass cutting wheel can be rapidly raised and lowered by means of a hand wheel which is connected to a sturdy threaded spindle. The main shaft of the cutting wheel rotates in dust-proof ball bearings. The machine can be moved in and out by a hand wheel and threaded spindle arrangement. A table is provided with T slots, making it possible to screw all types of attachments on the machine when requirements call for angular cutting. Clamping device can also be placed on the same machine and fastened to the T slots.

NEW DRAFT GAGE

The Hays Corporation, Michigan City, Indiana, has announced the availability of the Hays Vertiscale, a new draft gage which incorporates features that provide many benefits. Among these features are 3-way atmospheric vent, easy "one man" zero check; large identification label space; magnetic access door; fluorescent lighting for easy reading; removable units; no Paralax; dust-tight case; and Lucite scales.

The Vertiscale basic operating mechanism consists of a diaphragm, enclosed in a cast metal housing, the force and movement of which is balanced against the force of calibrating springs. The resultant force and movement of the diaphragm is transmitted through linkage to the pointer to indicate the magnitude of the draft, pressure, or differential to which the diaphragm element is subjected.

HIGH PRESSURE BLOWER

Standard Electric Mfg. Co., Inc., West Berlin 12, New Jersey, has made available a high pressure blower that quickly removes fumes, smoke, dust, sawdust and obnoxious odors.

The provision made, all-aluminum, high quality blower moves up to 450 cubic feet of air per minute. On the standard unit, made with a 5½" inlet and 3½" outlet, power is supplied by an enclosed 1/6 hp. Westinghouse, 115 V, single-phase AC, 3450 rpm motor. Larger sizes with different speeds and different current characteristics can be obtained.

CATALOGS RECEIVED

Ingersoll-Rand Company, Department C.P., 11 Broadway, New York 4, New York, has just released a new bulletin covering general purpose centrifugal pumps of the cradle-mounted type.

The bulletin covers five basic cradle groups and 17 corresponding pump types, their capacities, horsepower ratings and uses. There are also two pages covering pump dimensions and a table of performance under 60-cycle use. In addition, two pages describing special purpose units and design modifications are included.

American Standards Testing Bureau, Inc., 44 Trinity Place, New York 6, N. Y., has issued a new folder listing eighty different methods for testing, inspection, and analyzing some ninety different types of products.

Prepared to show industry and business the scope of services available to them for the quality control of many products, several methods are touched on briefly, such as Non-Destructive Testing; Testing for Performance, Corrosion Resistance, Protective Coatings; Chemical Analysis; Development of Specifications; Product Certification; and the Seal of Approval.

Gustin-Bacon Manufacturing Company, Kansas City, Missouri, has published a four-page folder that lists all pertinent information on its Ultrafine, the new thermal and acoustical insulation made of extremely fine, blown glass fibers.

Complete with pictorial illustrations of the product in use and with tables demonstrating Ultrafine's thermal and acoustical efficiency, the brochure treats in detail with physical properties, principal uses, handling characteristics, thermal conductivity (the insulation can be used on surface temperatures from sub-zero to 450-deg F.) and acoustical efficiency.

Listed, as well, are the facings available, handling characteristics, packaging information, and the engineering services available from the manufacturer.

Fischer & Porter Company, 7250 Jacksonville Road, Hatboro, Pa., has issued a new catalog describing completely the pneumatic, magnetic, electric, electronic, and electronic-follower transmission systems for use in measurement and control of flow, pressure, liquid level, viscosity, and specific gravity.

The catalog is profusely illustrated containing performance characteristics and schematic diagrams of the various systems.

Bailey Meter Company, 1050 Ivanhoe Road, Cleveland 10, Ohio, is distributing a new 8-page bulletin, No. 170, which discusses the engineering and economical planning of modern combustion and process control.

Numerous panel designs, fashioned for control, are illustrated, along with the most up-to-date methods of tubing and wiring. A section on panel accessories of utility and appeal combine to make a valuable source book of ideas for control station planners.

RUSSIAN TRANSLATIONS . . .

(*Continued from page* 28)

glass mass in the tank, as compared with the pot, was responsible for the greater ratio $FeO/(FeO + Fe_2O_3)$. This explanation is confirmed by the observation that the light transmission decreases during the passage of the glass mass through the tank; a sample taken behind the first burner had 13.5% absorption while a sample withdrawn behind the fourth burner had 14.9% for 1 cm. thick plates.

The ratio $FeO/(FeO + Fe_2O_3)$ can be reduced and thus the transparency improved by adding oxidizing substances to the batch. K. T. Bondarev made 26 experimental meltings in pots using six different oxidizers. The main results are summarized in the table. All the glasses listed in the table contained 71.8-72.0% SiO_2, 1.2% Al_2O_3, 0.1% MgO, 0.5% F, and 0.4% SO_3. The remaining oxides, the light transmissions of a 1 cm. thick plate, and the ratio $FeO/(FeO + Fe_2O_3)$ are shown in the table. The total sum of the oxides differs from 100.0% also in the original.

ACCELERATION OF GLASS MELTING BY ADDITIONS

Some salts, especially calcium floride, are sometimes added to glass batch in Russia as they accelerate the formation of glass. L. Ya. Mazelev now reports in *Steklo i Keramika* 9, No. 5, p. 6 (1952) the results of his laboratory tests on 41 additions. The batches were heated in unglazed china crucibles at 500-1000°C. for 30-60 min., and the lowest temperature at which glass formation took place was recorded. The fundamental batch, in one series of tests, gave a glass containing SiO_2 72.0, CaO 10.0, MgO 1.0, and Na_2O 17.0%; sodium oxide was introduced as sodium carbonate. In another series, the glass composition was different and sodium was introduced half as sulfate (mixed with wood charcoal) and half as carbonate. The results of this series are not reproduced in this abstract. To 100 parts of the fundamental batch, one part of compound under test was added.

The lowest temperature at which glass formation occurred in the fundamental batch was 1000°C. When the batch contained 1% of compound listed in the first column, the temperature of glass formation was that shown in the second column.

NaCl	900°C.	$(NH_4)_2SO_4$	1000°C.
KCl	900°C.	$(NH_4)_2S_2O_8$	1000°C.
CaF_2	1000°C.	$NH_4H_2PO_4$	1000°C.
NaF	1000°C.	$(NH_4)_2C_2O_4$	1000°C.
MgF_2	1000°C.	$(NH_4)_2CO_3$	1000°C.
NaBr	1000°C.	NH_4NO_3	1000°C.
KBr	900°C.	Na_2SO_4	900°C.
NH_4Br	1000°C.	K_2SO_4	900°C.
NaI	1000°C.	NaH_2PO_4	950°C.
KI	900°C.	$NaNO_3$	950°C.
NH_4I	1000°C.	KNO_3	800°C.
NH_4F	1000°C.	Na_2CO_3	1000°C.
NH_4Cl	1000°C.	K_2CO_3	1000°C.
NH_4SCN	900°C.	$Na_2B_4O_7$	900°C.

Sodium and potassium chloride, which are cheap and lower the temperature of glass formation by 100°, may be useful accelerators. Glasses produced on pilot plant scale with any of the above additions had a normal behavior.

INTERNATIONAL MINERALS DEVELOPS ORE REFINING PROCESS

The development of a new and revolutionary ore beneficiation process applicable to potash and phosphate, as well as to many other types of ores, has been announced by Louis Ware, President of International Minerals & Chemical Corporation. The process, which uses neither reagents nor water, but is a dry beneficiation method, has been named the LeBaron-Lawver Process.

The new method was developed under the direction of Dr. Paul D. V. Manning, International's Vice President in charge of Research, and Dr. I. M. LeBaron, Director of the firm's research laboratories.

In the LeBaron-Lawver dry beneficiation process, the ore is ground, dried, and given a simple and inexpensive treatment, after which the ground ore is passed between electrodes. As the treated ore passes between the electrodes, it separates into various minerals.

Mr. Ware also announced that International will immediately build a new and larger pilot plant at the present Carlsbad Refinery to operate continuously treating semi-commercial quantities of potash by means of the new method.

HOMMEL SERVICE AWARD CEREMONY

The Annual Service Pin Award ceremony took place on December 20 when thirty-two employees of The O. Hommel Company received service pins ranging from five years of service to twenty-five years. Presentation of the pins was made by Ernest M. Hommel, President of the firm.

Twenty employees received pins for five years of service; five for ten years; four for fifteen years; one for twenty years; and two for twenty-five years.

COLORADO FUEL BUYS JOHN ROEBLING COMPANY

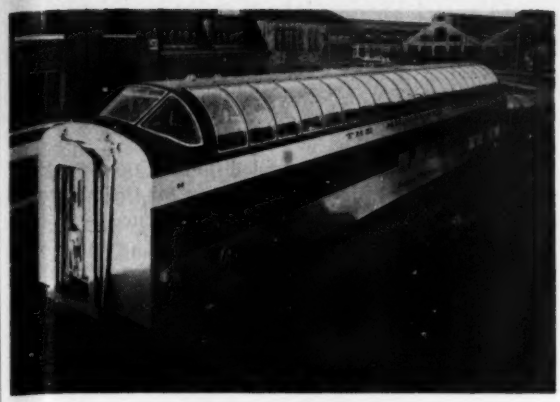
A wholly-owned subsidiary of The Colorado Fuel and Iron Corporation has contracted to buy all the manufacturing business, plants, and inventories of John A. Roebling's Sons Company.

The Roebling business will be operated as a subsidiary of Colorado Fuel and Iron under the Roebling name. Charles R. Tyson, President of Roebling since 1944, will continue to direct the operations of the Roebling plants.

PENNSALT GENERAL SALES MANAGER DIES

Russell S. Roeller, General Sales Manager of Pennsylvania Salt Manufacturing Company, has died at the age of 60 following a brief illness.

During most of his career, his chief interest was in developing markets for bulk or tonnage chemicals, and establishing long term customer relationships for such chemicals. He joined the firm as a salesman in 1922 and was appointed its Philadelphia District Sales Manager in 1933. He became Field Sales Manager in 1942. Mr. Roeller assumed additional administrative duties with his appointment as Assistant General Sales Manager in early 1950 and soon thereafter was named General Sales Manager. Last week he was honored for his 30 years of service with Pennsalt at a luncheon with company executives.



FIRST ALL-DOME RAIL CAR

America's first all-dome railroad lounge cars, built for the Milwaukee Road by Pullman-Standard Car Mfg. Company, a subsidiary of Pullman Incorporated, went on display in five western cities on December 5.

The full-length observation-dome section will seat 68 passengers in foam rubber cushioned seats built to provide unobstructed view through curved glass window sections measuring more than three feet wide and five feet high. Glass in the dome section alone covers 625 square feet, more than 3½ times the glass found in the conventional dome car.

The air conditioning and power equipment is located in two compact compartments at each end of the car. Equipment compartments are accessible from the outside for maintenance at regular division stops, or from the inside for inspection enroute. Fuel tanks, water tanks, steam traps, air line equipment, and other fittings are carried on the underside of the depressed center portion of the car in a compact arrangement.

One of the most interesting new features of the heating and cooling system are two Solar Discs, located outside the dome section on the car's roof. These small gadgets supplement the regular thermostatic controls to offset the greater susceptibility of the car's interior to changes in outside temperatures due to the large expanse of glass in the dome section. These devices lower the temperature setting of the thermostats automatically to offset the heat from the sun, and when a cloud blacks out the sun, the Solar Discs immediately call for more heat to keep the car comfortable.

FIBERGLAS COROTOP DEVELOPED BY OWENS-CORNING

Development of Fiberglas Corotop for fast, economical maintenance of asphalt roofs has been announced by Owens-Corning Fiberglas Corporation. A new heavy duty, weather-tight surface for old or worn asphalt roofs, the product is a combination of non-rotting Fiberglas Corotop roofing mat and specially processed Fiberglas Corotop liquid asphalt. It is applied cold by brush or spray.

The roofing mat, available in rolls, is light weight and easy to handle. A four-man crew, for example, can lay as much as 40,000 square feet a day. The mat weighs only two pounds per square of 100 square feet. It is packed in rolls, each weighing 11 pounds and covering 5½ squares.

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HUMIDITY CONDITIONING . . .

(*Continued from page* 26)

was engineered to account for this mixture of a small amount of high moisture content solution with the full strength solution in the single air washer. The regenerated absorbent is returned to the single washer and a large amount is allowed to drain back to the parallel washers to replenish the spent solution.

Refrigeration of 87 tons is utilized by the parallel units. Again, refrigeration cools both the high temperature entering air and the hot regenerated absorbing solution. Dry after-heating, using 5 psig steam, is used to bring the conditioned air to the delivery temperature necessary to maintain the space atmosphere. Total belt slot area here is 46.8 square feet. This unusually large area requires separate "pin-point" conditioning with 5,000 cfm of air, all of which is recirculated, dehumidified, and returned to the room.

Summary

Room air conditions of approximately 68 F. and 20% R.H. are required for vinyl resin plastic processing in laminated safety glass plants. Chemical absorbent-type humidity conditioning equipment has proven more satisfactory and economical to attain this result than any other method of air conditioning.

Several arrangements of standardized units of chemical absorbent-type equipment are available in order to meet the specific requirements of diverse manufacturing operations in the most efficient manner. Principally, these problems are (1) for a small volume of conditioned air; (2) a large volume of conditioned air using mainly that which can be recirculated; (3) a large volume of conditioned air using a high percentage of fresh air; (4) additional air conditioning for conveyor belt slot openings; and (5) the cooling medium—well water, city water, refrigeration, etc.—available.

This article has been confined to the problems encountered and the techniques employed for their solution in the handling of plastics by the laminated glass industry. However, similar air conditioning practices are employed in many other aspects of plastics processing.

RESEARCH DIGEST . . .

(*Continued from page* 34)

vide stones in sufficient quantity to result in a very substantial loss of production.

The ultimate practical elimination of stones depends not only on carefully controlled operating conditions, but also on improved design of furnaces, on better systems for combustion of fuel, and on selection of the most suitable refractories. Doubtless, some furnaces already in existence meet practical requirements, but, at the same time, it must be recognized that these are largely the result of cut-and-try changes and improvements and that there is still much to be done in establishing the fundamental factors of design for continuous glass melting furnaces. The furnace operator, the glass technologist, the petrographer, the ceramic engineer, the instrument engineer, and the furnace designer can all contribute their skills, and if these can be coordinated, vast improvement in glass melting furnaces is certain to result.

• DESIGN
• ERECTION
• OPERATION

of Glass Plants

DOMESTIC AND FOREIGN

Complete Glass Plants and Equipment, Batch Systems, Glass Melting & Sodium-Silicate Furnaces, Batch Feeders, "Schmid" Mechanical Gob Feeders, "Liberty" Pneumatic Gob Feeders, Automatic Handling Equipment, Stackers, Lehrs, Machines, etc. for manufacture of containers, flat glass, pressed ware, and tubing. Furnace Repairs and Rebuilding. Process Engineers.

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EXHIBIT OF AMERICAN GLASS FEATURED BY CORNING

"The Story of American Glass" is being presented by Corning Glass Works, the first showing having been featured at the new Exhibition Gallery at Steuben Glass in New York City.

This collection of approximately 100 historic pieces is the first of a series of important traveling exhibitions organized by The Corning Museum of Glass, Corning Glass Center. The series is designed to bring to the public a comprehensive coverage of the history of glass. After their initial showing in New York, the exhibitions are being circulated to leading museums in the United States.

"The Story of American Glass" is shown in nine cases, each devoted to a period or style of American glassmaking, from its earliest beginnings to the present day. To demonstrate the strong European influence on early American styles and techniques, European and American objects are frequently shown side by side.

DR. R. B. SOSMAN NAMED BLEININGER AWARD WINNER

Dr. Robert B. Sosman, Professor at Rutgers University and noted ceramist and authority on silica and refractories, has been named the 1953 recipient of the Albert Victor Bleininger Award. The announcement was made at the December meeting of the Pittsburgh Section of the American Ceramic Society.

Dr. Sosman was born in Chillicothe, Ohio, in 1881. He received his college education at Ohio State University, graduating with a B.Sc. degree in 1903, and at Massachusetts Institute of Technology, where he received a S.B. degree in 1904 and a Ph.D. three years later. During 1906 to 1908 he was employed at the Arthur D. Little Laboratory. He then became associated with the Geophysical Laboratory at the Carnegie Institution of Washington, serving as physicist from 1908 to 1928. He was acting director of the Laboratory during 1918 to 1920.

In 1928, Dr. Sosman went with the United States Steel Corporation's Research Laboratory as a physical chemist. In 1944 he was appointed assistant director and acted in that capacity until his retirement in 1947. Since 1947 he has been a Professor in the School of Ceramics at Rutgers University. Dr. Sosman is the author of numerous technical papers and of the well-known book, "Properties of Silica."

FOOTE ADDS TO RESEARCH STAFF

Foote Mineral Company has announced that Dr. J. F. Haseman has joined its Research and Development Staff at Berwyn, Pa. As group leader of the new Minerals Separation Division, Dr. Haseman will head up a team consisting of a mineralogist, a chemist, and a geologist. This new division will study the field of mineral separation and processing dealing with lithium ores and the various by-products of Foote's King's Mountain, N. C., and Sunbright, Va., operations.

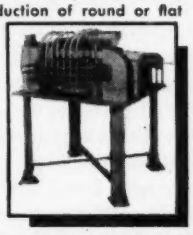
A graduate of the University of Missouri, Dr. Haseman obtained his Master's Degree from Cornell in 1938 and his Doctor's Degree from Missouri in 1944. He was a research chemist with the Tennessee Valley Authority Wilson Dam, Alabama, from 1944 until joining Foote.

Kahle

experience... still the best teacher

A large manufacturer of miniature lamps for switchboard and telephone use, came to Kahle recently with a production problem. The client had been using a low-production tube bottoming machine that required frequent adjustment and maintenance due to its method of uneven shifting of the tubing. This also caused excessive tube breakage within the machine and a high reject rate on the finished tubes. Kahle's solution was to build the full automatic machine shown below, Model 2048. This machine, producing 4,000 units per hour, eliminates the lifting of the glass from one position to the next by using a continuous conveyor principle. The glass is indexed straight through the machine and is not 'jumped' or 'bumped' in the process. In-machine breakage and rejects are held to a minimum. In addition, Model 2048 is ideal for production of round or flat bottomed test tubes, vials and containers.

If your production involves special-purpose machinery, learn — without obligation — how Kahle's more than 40 years of practical experience can benefit you. Write Kahle today.



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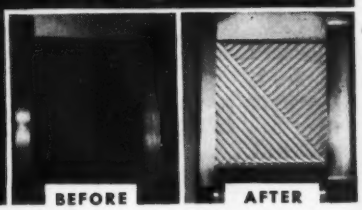

Actual untouched photos of mold before and after cleaning with Hydro-Finish

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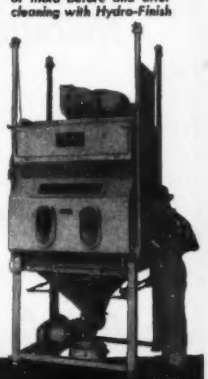

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GLASS CONFERENCE . . .

(*Continued from page* 18)

paper "Three Dimensional Furnace Photography" by Lester W. Piper of the General Electric Company. Pointing out that the stereo camera can greatly extend the limits of normal vision, Mr. Piper presented a review of the types of stereo cameras which are now available, together with their limitations. He also discussed some of the more important factors to be considered in taking good stereo pictures, of which the use of cross lighting in order to obtain good profile was placed foremost.

Henry E. Walker of the Harding Glass Company, in presenting "Sketches on Glass Batching Plant Design and Operation," stated that in many cases it is possible to cut mixing costs by one-half by the introduction of a new batching process. Many plants are using outmoded batching processes which account for general inefficiency and constitute a definite health hazard for the working force. The batching processes of some seven different plants, which ranged from highly mechanized to simple hand operations, were shown by means of colored slides. It is interesting to note that many of the new batching processes in the glass industry have as their origin, similar processes in the coal and grain industries.

Morton Cressy of the Hartford-Empire Company discussed the "Factors Influencing Plant Design for the Production of Glass Containers." It has been found that flow feeders give the highest rate of production. Mr. Cressy submitted data on the number of units of the type he was discussing that are now in use in glass plants throughout the world. Various graphs were shown which illustrated the growth curve of glass containers in this country, as well as others. Some of the factors which affect production of glass containers are, (1) better understanding of glass properties, (2) operation of the glass plant on a 24-hour day, 7-day week basis, (3) better furnace design, (4) better production equipment, (5) availability of better refractories. It is possible through modernization of forming processes to manufacture more glass from approximately the same furnace melting area. It was stated that a five to six shop furnace, utilizing double gob feeding, is the most efficient.

In his paper "Plant Layout and Design," R. S. Arrandale of the Thatcher Glass Mfg. Company stated that carton and batch materials constitute one-third to one-half of the cost of the finished product. One method of overcoming this unequal balance is to produce a lighter weight container, which will mean more products/ton of glass but less money/item.

The main portion of Mr. Arrandale's presentation was concerned with the development of a new set of equations for the calculation of fluid flow. The latter portion of this talk was on the application of this new equation to plant problems and operations.

The final paper to be presented before this 13th Glass Conference was concerned with the use of electric boosting in the melting of glass. Delivered by L. Penberthy of the Penberthy Instrument Company, it was pointed out that the literature contains quite a bit of information on this particular type of melting, although most of it is of an experimental nature, since industry seems rather reluctant to release data of this type. Some of the advantages of electric boosting in melting are said to be (1) increased tonnage (approximately 50%), (2) increased

refractory life. It is thought that electric boosting eliminates "micro" stones of silica through increased migration of the sodium ion under the influence of the electric potential.

Electric boosting is particularly suitable for the melting of iron containing glasses. Conventional radiation type of melting is not too efficient since the temperature decreases approximately 100°F/foot of depth in the melt for a glass containing 0.2% iron. The power needed for this particular operation is roughly 600 KWH/ton of glass. This increased cost/ton can be offset, however, by increased tonnage and refractory life.

NATIONAL PACKAGING EXPOSITION SCHEDULED FOR APRIL

More than 350 exhibitors, occupying a total of 130,000 square feet of display area, with an attendance of upwards of 20,000, are expected at the American Management Association's 22nd National Packaging Exposition to be held April 20 through 23, 1953, according to association spokesmen.

The Association has also announced its annual Packaging Conference, to be held concurrently with the Exposition, to start April 20 and conclude at noon, April 22. The Packaging Conference will be devoted mainly to consideration of a broad range of topics relating to packaging management and technique, including problems of merchandising, industrial packaging, high-speed production line packaging, training of personnel, etc. Special attention will be given to the packaging problems of specific industries.

For the first time at an A.M.A. Packaging Conference, a special "workshop exhibit" of materials useful to packaging management will be on display for registrants at the meeting. The exhibit will consist of forms, brochures, instruction manuals, training manuals, books, programs, reports and records, and other printed matter relative to packaging, packing and shipping.

DIAMOND ALKALI NAMES DIRECTOR AND MAKES STAFF CHANGES

John C. Virden, Cleveland industrialist, has been elected a Director of Diamond Alkali Company, according to Raymond F. Evans, President. Board chairman for the past 16 years of the firm which bears his name, Mr. Virden brings to Diamond a broad background in the fields of business and governmental administration built through more than three decades of service.

New assignments for two members of the company's sales organization have also been announced. Justus U. Belville becames staff assistant to J. C. Forsyth, Manager of Alkali Specialty Sales, and Kemble S. Lewis becomes Assistant Manager of Diamond's Chicago Branch.

A graduate of Colgate University, Mr. Belville joined Diamond Alkali in 1941, doing merchandising and specialty sales and service work in the Pittsburgh area. He rejoined the firm in 1946, following service in World War II, and was later transferred to Chicago. He later became assistant manager of the Chicago sales office.

Mr. Lewis has been associated with Diamond since 1947, when he joined the Chicago office to do technical sales and advisory work. He had recently been active in the sales activities of the firm's chemical line.

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AMERICA'S OLDEST INDUSTRY . . .

(*Continued from page* 19)

Glass Company; Mr. and Mrs. W. L. Orme, Cambridge Glass Company; Mr. and Mrs. John C. Weber, Jr., West Virginia Glass Specialty Company; Mr. and Mrs. Conrad T. Swartling, and Mr. and Mrs. C. E. Willis, Viking Glass Company; William H. Blenko, Sr., and W. H. Blenko, Jr., Blenko Glass Company; Dr. Harrison P. Hood, Corning Glass Works; James M. Brown, Director, Corning Glass Center; C. B. Roe, retired former president of Fostoria Glass Company, and Mrs. Roe; A. K. Wood, retired former president of McKee Glass Company, now treasurer of Pittsburgh Glass and China Show; H. L. Dillingham, American Glassware Association; Helen V. Denson and Erwin M. Frey, public relations counsel.

National Park Service officials present included Conrad L. Wirth, Director, National Park Service of the U. S. Department of the Interior, and Mrs. Wirth, Chevy Chase, Maryland; Roland F. Lee, Assistant Director, NPS, and Mrs. Lee, Washington, D. C.; Elbert Cox, Regional Director, Region One, NPS, and Mrs. Cox, Richmond, Va.; Edward A. Hummel, Superintendent, Colonial National Historical Park, Yorktown, Va.; Herbert E. Kahler, Chief Historian, NPS, and Mrs. Kahler, Washington, D. C.; Charles E. Hatch, Jr., Historian, Colonial National Historical Park, and Mrs. Hatch; J. C. Harrington, Regional Archaeologist, Region One, NPS, and author of "Glassmaking at Jamestown," and Mrs. Harrington, Richmond, Va.; George F. Emery, NPS, Yorktown, Va.; Albert W. Banton, Jr., NPS, and Mrs. Banton, Yorktown, Va.

PITTSBURGH CORNING APPOINTMENTS

The appointment of A. I. Holmes as Manager of Foamglas Building Insulation Sales has been announced by Paul D. Japp, General Sales Manager of Pittsburgh Corning Corporation. Mr. Holmes will direct all phases of the company's Foamglas sales for use in roof, wall and floors of normal temperature buildings, and in prefabricated sandwich panels. He has been associated with the firm since 1940 as sales representative and as field supervisor of Southeastern sales.

Mr. Japp has also announced the appointment of W. H. Polk as Director of Advertising-Sales Promotion. Mr. Polk, who joined Pittsburgh Corning in 1947 as sales engineer, has been handling PC glass blocks and Foamglas.

Also announced was the appointment of E. H. Martin, Jr., as Manager of Foamglas Low Temperature Insulation Sales. Mr. Martin will direct all phases of the company's Foamglas sales for these installations. He has been with the firm since 1949 as Assistant Manager of Foamglas Industrial Insulation Sales and as Manager of Foamglas Building Insulation Sales.

Mr. Japp has also announced the opening of a district sales office in Kansas City. Howard G. Jones has been appointed District Manager of the new office, which is located in the Fairfax Building, 101 West 11th Street. Mr. Jones was formerly a field representative for Pittsburgh Corning in the Southern Illinois, Kansas and Missouri areas.

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LEON HOUZE, JR. ELECTED SECRETARY-TREASURER

Leon J. Houze, Jr., has been elected Secretary-Treasurer of the L. J. Houze Convex Glass Company, it has been announced by Erson V. Ogg, Executive Vice President.

Mr. Houze, youngest son of the founder of the firm now observing its 50th year, recently held the office of Assistant Secretary. He will continue to serve as Purchasing Agent and as a member of the Board of Directors.

THATCHER ELECTS NEW VICE PRESIDENT

At its most recent meeting, the Board of Directors of Thatcher Glass Manufacturing Company, Inc., elected Philip W. Hatch a Vice President of the firm. Mr. Hatch has been placed in Charge of Sales for the McKee Glass Division and will report direct to David R. Parfitt, Vice President and General Sales Manager.

Mr. Hatch joined the Thatcher organization early last spring after a 20-year association with Ball Brothers Company, for the last several years of which he was Sales Manager of the Commercial Container Division.

• Fred W. Fraley, a Vice President of Diamond Alkali Company who has been "on loan" to the U. S. Government, will return to Diamond, according to a recent announcement. In announcing Mr. Fraley's return, Diamond President Raymond F. Evans explained that Mr. Fraley's duties will involve special assignments, including relationships of the company with the government and the chemical industry as a whole.

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• John S. Algeo, Vice President and General Sales Manager of Hazel-Atlas Glass Company, has announced the retirement of R. L. Clark and the appointment of Roland & Keller as the company's District Sales Agent with offices in the Fox Building, Detroit, Michigan. Robert W. Mellott and Robert R. Distler will be associated with Mr. Keller.

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